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The University of Georgia, School of Health Sciences and Public Health, Tbilisi

The Arctic University of Norway, Tromsø

Ivane Javakhishvili Tbilisi State University, Faculty of Medicine

**Caucasus Journal of Health Sciences and Public Health**
*Official journal of the University of Georgia and Iv.Javakhishvili Tbilisi State University*





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## About the Journal

Creation of "Caucasus Journal of Health Sciences and Public Health" was initiated by Iv.Javakhishvili Tbilisi State University, The University of Georgia and The Arctic University of Norway, Tromsø. It was promoted within the project: Norway Experience of Third Cycle Studies for Georgia, Project number CPEA-2012/10040.

"Caucasus Journal of Health Sciences and Public Health'' is designed for field researchers, whose scientific works need to be published, discussed and rated by experienced professionals. It is particularly significant, that the journal encourages young researchers to publish their work.

In scientific board of "Caucasus Journal of Health Sciences and Public Health'' there are successful scientists from different countries, who participate as volunteers.

Caucasus Journal of Health Sciences and Public Health include:

- Health Sciences, Medicine
- Global and International Health
- Public Health Governance, Policy
- Health Care Management
- Public Health Practice and Impact
- Epidemiology, Environmental Health, Lifestyle and Behavior
- Health Information Systems
- Health Protection, Health Promotion and Disease Prevention
- Evaluation of Public Health Interventions or Programs
- Health Law and Ethics

This is not an exhaustive list and the Editors will consider articles on any issue related to Health Sciences and public health.

Public Health also publishes invited articles, reviews and supplements from leading experts on topical issues.

Publication is free of charge.
The journal is electronic.

**Caucasus Journal of Health Sciences and Public Health**
*Official journal of the University of Georgia and Iv.Javakhishvili Tbilisi State University*

## About the Editors

### Editors-in-Chief:

**Amiran Gamkrelidze**
MD, PhD, ScD, Professor

Key qualifications:
- ◊ 1990, Institute of Immunology, Moscow, USSR, defended second Academic Degree (ScD)
- ◊ 1979, Tbilisi State Medical Institute, Georgia, defended first Academic Degree (PhD)
- ◊ 1968-1974, Tbilisi State Medical Institute, Georgia, Diploma of Physician (MD)

Relevant work experience:
- ◊ 2013-present, National Center for Disease Control and Public Health , Tbilisi, Georgia, General Director
- ◊ 2005-2013, WHO Country office in Georgia, Country Programme Coordinator for STIs / HIV / AIDS
- ◊ 2004-present, University of Georgia, Tbilisi, professor
- ◊ 2004-present, Tromso University, Norway, visiting professor
- ◊ 2004-present, Center of Allergy and Immunology, scientific advisor
- ◊ 2001-2004, Ministry of Labour, Health and Social Affairs, Minister
- ◊ 1999-2000, Ministry of Labour, Health and Social Affairs, First Deputy Minister
- ◊ 1994-1995, National Health Management Center, Director
- ◊ 1982–1987, Institute of Clinical Immunology of Freidrich Schiller University, Jena, Germany, researcher in clinical immunology
- ◊ 1982–1987, Department of Pediatrics of the University of Linkoping, Sweden, researcher

Dr. Amiran Gamkrelidze is a member of Editorial Boards of Journals: World Allergy Organization Journal, Allergo-Journal (Germany), Georgian Medical News, Georgian Respiratory Journal. He is also a member of the European Academy of Allergy and Clinical Immunology, German Association of Allergology and Clinical Immunology, Board of Georgian Association of Allergology and Clinical Immunology.

**Toralf Hasvold**
MD, PhD, Professor

Key qualifications:
- ◊ Qualified as Medical Doctor at Oslo University in 1973
- ◊ Defended my PhD in 1996 at Tromsø University, Norway
- ◊ Licensed as Specialist in Public Health / Community Medicine in 1996
- ◊ Licensed as Specialist in General Practice 1988 – 1998 (Did not relicense after 1998)
- ◊ Licensed as Trainer in General Practice from 1988

Relevant work experience:
- ◊ Professor of General Practice, University of Tromsø 01.12.98 -
- ◊ Professor emeritus since 01.01.2011
- ◊ Director of Centre of Integrated Care and Telemedicine, University Hospital of North Norway: 01.08.08 – 01.01.11
- ◊ Dean of Medical Faculty, University of Tromsø: 01.08.05 – 01.08.07
- ◊ Honorary Professor of Public Health at University of Georgia: 01.09.2009 –
- ◊ Visiting professor, James Cook University, Townsville, Australia: 28.10.02 – 31.03.03
- ◊ WHO Public Health Advisor to the Ministries of Health in the Republic Armenia and Georgia: 01.12.96 – 02.12.98
- ◊ WHO Public Health Advisor to the Ministries of Health in the Republic Armenia and Georgia: 01.12.96 – 02.12.98
- ◊ Municipality doctor/Public Health Officer/Chief Doctor in Bardu Municipality: 01.04.85 - 01.08.96
- ◊ Bardu: District doctor: 01.07.83 - 01.04.85
- ◊ Salangen: District doctor - in charge: 01.04.82 - 01.07.83
- ◊ Balsfjord: District doctor - in charge: 21.11.74 - 01.05.78 and 01.05.80 - 31.03.82

**Executive Editor**

**Vasil Tkheshelashvili**
MD, JD, PhD, ScD, Professor

Key qualifications:

- ◊ 2006, Washington, USA, ACS and UICC training in "Global Mission in Cancer Control"
- ◊ 2000, Sofia, Bulgaria, IACR and ENCR training in "Population Based Cancer Registration"
- ◊ 1997-2002, Tbilisi Law Institute, Diploma of Lawyer (JD)
- ◊ 1989-1992, Prof. N.Petrov Oncology Research Institute, St.-Petersburg, Russia; In 1992 defended second Academic Degree (ScD)
- ◊ 1988, Oncology Scientific Center, Moscow , IARC training in "Cancer Epidemiology"
- ◊ 1979-1982, Prof. N.Petrov Oncology Research Institute, Leningrad, USSR; In 1982 defended first Academic Degree (PhD)
- ◊ 1977-1979, Oncology Scientific Center, Tbilisi , Postgraduate training in oncology, Licensed as Specialist in Oncology
- ◊ 1971-1977, Tbilisi State Medical Institute, Georgia, Diploma of Physician (MD)

Relevant work experience:

- ◊ 2011-present, The University of Georgia, Tbilisi, Professor
- ◊ 2010-2011, G.Natadze Research Institute of Sanitary, Hygiene and Medical Ecology, Deputy Director
- ◊ 2006-2010, The University of Georgia, Tbilisi, Invited Teacher
- ◊ 2005-2006, Georgian State Medical Academy, Tbilisi, Professor
- ◊ 2004-2006, Tbilisi Cancer Center, Deputy Director, Head of Population Based Cancer Registry
- ◊ 1999-present, National Association of Cancer Control (NACC), Tbilisi , Founder and President
- ◊ 1994-2009, National Cancer Center, Tbilisi Department of Cancer Epidemiology and Control, Head
- ◊ 1994-1996, National Cancer Center, Tbilisi, Deputy Director in Information and Cancer Control
- ◊ 1983-1994, Oncology Scientific Center, Tbilisi, Department of Gynecology, Scientific Staff (steps: Junior, Senior, Leading )
- ◊ 1982-1983, Oncology Scientific Center, Tbilisi, Department of Gynecology, MD, Oncologist, Gynecologist

**Members of the Editorial Board:**

**Zaza Avaliani**
MD, PhD, Professor

Key qualifications:

- ◊ 1994-2003, Doctor of Philosophy (PhD), Tbilisi State Medical University, Tbilisi, Georgia.
- ◊ 1984-1986, Doctor Pathology-anatomist, Tbilisi State Medical Institute, Tbilisi, Georgia.
- ◊ 1978-1984, Medical Doctor (MD) specialized in General Medicine. Tbilisi State Medical Institute, Faculty of Medicine, Tbilisi, Georgia.

Relevant work experience:

- ◊ 2014–Present, Executive Director of National Center for Tuberculosis and Lung Diseases
- ◊ 2013–2014, Medical Director - Martin D. Abeloff Laboratory, Cancer Research Center
- ◊ 2012–Present, Deputy Director Tbilisi Central Hospital
- ◊ 2012–Present, full Professor Georgian University Nursing School
- ◊ 2012 Present, Deputy Director, Medical-diagnostic clinic "444", Tbilisi, Georgia.
- ◊ 2012–Present, Program and Project Administration Head at clinic "Health Center", Tbilisi, Georgia.
- ◊ 2011-Present, Medical doctor (MD), Pathologanatomist, clinic "Geohospitals", Georgia.
- ◊ 2007–Present, President, Association of Georgian Pathologists XXI, Tbilisi, Georgia.
- ◊ 2006–Present, President, Association of Medical Education Professionals, Tbilisi, Georgia.
- ◊ 2002–Present, Member, National Bioethics Council, Expert at Ministry of Labor, Health and Social Affairs, Tbilisi, Georgia.
- ◊ 1999–Present, Member, Association for Medical Education in Europe.
- ◊ 2009–2010, Director, Vocational Training Center "Speqtri", Tbilisi, Georgia.
- ◊ 2009–2010, Expert at National Scientific Fund, Tbilisi, Georgia.
- ◊ 2007 – 2009. Full professor, program leader, IB EuroCaucasian University, Tbilisi, Georgia.
- ◊ 2007–2009, Head of Strategic Development and Quality Control Department, Aversi Clinic, Tbilisi, Georgia.
- ◊ 1998 – 2007. Associated Professor, Pathology Department, Tbilisi State Medical University, Tbilisi, Georgia.
- ◊ 2003 – 2006. Vice-rector, Head of Education/Sciences Department, Tbilisi State Medical University, Tbilisi, Georgia.

**Members of the Editorial Board:**

**Nino Chikhladze**
MD, PhD, Associate Professor

Key Qualifications:

- ◊ 1988-Qualified Medical Doctor at Tbilisi State Medical Institute, Faculty of Medicine, Georgia
- ◊ 1988-Faculty of International Relation with specialization in French, Tbilisi State University, Georgia
- ◊ 1989-Tbilisi State Medical University Hospital №2, Internship in Internal Medicine, Georgia
- ◊ 1997-PhD at Tbilisi State University, Georgia
- ◊ 2001-Licensed as specialist in Public Health and Health Care Management

Relevant work experience:

- ◊ Since 1988 she has been involved in clinical activities, since 1992 - in academic activity as well. Since 1996 she has been lecturing at TSU. From 2006 till present she is an Associate Professor at the Public Health Department of the Faculty of Medicine of TSU and the Head of Faculty's Quality Assurance Department. She is also a member of Faculty Scientific Board.
- ◊ Since 2005 she has been actively involved in reformation of Higher Medical Educational System of Georgia. She is a co-author of ,,Benchmark Statement in Medicine'' (2011) and ,,Benchmark Statement in Nursing'' (2010) in Georgia. She is an Expert of National Center for Educational Quality Enhancement of Georgia.
- ◊ She is an Expert of the UNESCO Global Ethics Observatory. She has been involved in academic activities as a scholar, visiting professor in the frame of different programs at Universities Paris and Rennes (France), Granada (Spain), Tartu (Estonia).
- ◊ She has an experience in coordinating International projects (supported by European Union, Norwegian Center for International Collaboration in Education) in the sphere of Public Health and Medical Education.
- ◊ She is the author of scientific works and manuals. She is a member of Scientific Editorial Board of International Journals (Morocco, Poland).
- ◊ Professor Nino Chikhladze has been awarded for her contribution to the Development TSU Medical Faculty.by TSU Administration.

**Tamar Lobjanidze**
PhD(c)

Key qualifications:

- ◊ 1979-1986 Tbilisi State University, Medical Physics Faculty, Graduate Diploma
- ◊ 2013/05-up to now PhD (c) in Public Health (Doctoral Thesis: "Evaluation Systems and development of Public Health and Social Services Modeling in Georgia") , The University of Georgia

Relevant work experience:

- ◊ 2006-up to now Dean of School of Health Sciences and Public Health, The University of Georgia
- ◊ 2016/1- up to now Team leader for UG, SIU Project CPEA-2015/10057 "Georgian-Norwegian Collaborative in Public Health (GeNoC-PH)
- ◊ 2010/10- up to now Co-director of bachelor program "Healthcare Administration" and master program: "Public Health and Health care Policy"
- ◊ 2007- up to now Member of board, National Medical center of Developing and inculcation of Guidelines and Protocols, MOLSHA (Ministry of labor, Health and Social Affairs of Georgia)
- ◊ 2012/6 - 2015 Co-coordinator, coordinator for Georgians HEIs
- ◊ SIU Project CPEA-2012/10040 "Doctoral Programme in Public Health: Norway Experience of Third Cycle Studies for Georgia"
- ◊ 2011/9-2011/12 Project Coordinator, Project N TACIS/2007/147562, contract EU/ET/04-24 "Preparation of Academic Personnel for Nursing in Bachelor Study"
- ◊ 2010/10- 2013 Academic Staff, TEMPUS project No.511303-TEMPUS-1-2010-1-UK (GE) "Master Programmers in Public Health and Social Services"
- ◊ 2009/9 – 2010/5 Project Coordinator, Training for Health Sector Managers, GHSPIC Project 2.1./LTA
- ◊ 2009 –up to now Affiliated Faculty University of Scranton, PA, USA, Health Management Education
- ◊ 2007-2009 Board Member, Join Committee of Healthcare Reforms in Georgian Penitential systems
- ◊ 2005-2008 Top Manager, Epilepsy Prevention Centre of Georgia
- ◊ 2004-2009 Regional Coordinator, Children Safety Programme with seaport of USAID ACTS-International Georgia
- ◊ 1996-2004 Vice-Chief, Public Health Department (MOLSHA Georgia)

**Members of the Editorial Board:**

**Nata Kazakhashvili**
MD, PhD, Associate Professor

1973-1979 studied in TSMU, after graduation conducted practical medical work in 1980-1986. In 1986 started to work in the public health sector and health organization from Tbilisi municipal health service. In 1993-2007 she worked in health care system of Georgia at different managerial positions, including head of mother and child issues department, head of state health program management department, deputy general director in the issues of medical insurance of united state foundation of Georgian social insurance. She has been participating in and cooperating with partner programs implemented by international organizations in Georgia since 1994. She has been actively involved in international conferences and seminars regarding issues of public health; the most important among them are: preparation of European declaration of rights of the patients (1994, Amsterdam, Netherlands), training course in management (1994, Atlanta, USA), implementation of strategy of improvement of health protection of mother and child in developing countries (1997 WHO European regional bureau, Copenhagen, Denmark), implementation of the first project of World Bank and Georgia about reform of the health care system (1995-1999); participation in primary health care system reform project together with WB/EU/DFID/OPM (1998-2002); In 2004-2008 she together with Oxford Policy group (OPM) participated in preparation of training program for managers of primary health care, as a member of the training program and a lecturer. She has been an associate professor of TSU since 2004 and she manages training programs of the bachelor and postgraduate students "Public health care", "Organization and management of health care". Since 2006 she has been managing training courses of postgraduate: "Bioethics and medical law", "Management and improving of quality of medical service". She participates in implementation of a partner program of SU/Scranton University. From 2012 she participated in International Project "The World Justice Project" (WJP) as Expert. she have had TEMPUS project "postgraduate programs in public health and social service". Duration of the project is 36 months - 2010-2013 and USAID/G-PAC/TSU projects "preparation and implementation of educational programs for teaching the health policy in Iv. Javakhishvili Tbilisi State University" the duration of the projects May 2011-December 2011. She is a corresponding member of the academy of medical-social sciences, member of professional association of perinatologists and neonatologists, member of the society of pediatricians of Georgia, expert-consultant of the magazine "Parents' school", author of 32 scientific works, reviewer of numerous manuals and methodological recommendations, a consultant. She was awarded by a special medal and a certificate of WHO/EURO for eradication of poliomyelitis in European region. She has been working as a first deputy Director General of Chachava clinic and continues pedagogical activities in Tbilisi State University, as well as University of Georgia.

**Paata Imnadze**
MD, PhD, Professor

Science Director, National Center for Disease Control and Public Health (NCDC), Tbilisi, Georgia. 1992-2010 he was Director General of the NCDC. He continues to serve as the head of the Department of Public Health at the Tbilisi State University, and was formerly Associate Professor of the Department of Microbiology and Immunology at the Tbilisi State Medical University. He is member of the National Council on Bioethics and President of the Public Health Association. Prof. Imnadze was a member of the WHO Intergovernmental Working Group on the Revision of the IHR (2004-2005), the WHO European Technical Advisory Group of Experts on Immunization (2005-2011), and in 2012 was a member of the Editorial Group "Environmental health inequalities in Europe". From 2003 to 2006 he was a member elect of the Joint Coordinating Board of the UNICEF/UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases. He is a Member of the International Health Regulations (2005) Emergency Committee concerning Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Prof. Imnadze published 40 peer-reviewed articles, 3 manuals, about 100 abstracts, and has been honored with the Order of Dignity.

**Members of the Editorial Board:**

**Alexander Tsiskaridze**
MD, PhD, ScD, FESO, Professor

Professor of Neurology, Dean of the Faculty of Medicine at Ivane Javakhishvili Tbilisi State University, Scientific Director at the Sarajishvili Institute of Neurology and Head of Neurological Service at Pineo Medical Ecosystem.

After obtaining the Honor Diploma of Medical Doctor from Tbilisi State Medical University, Alexander Tsiskaridze continued his academic career in Sarajishvili Institute of Neurology in the capacity of intern (1988-1989). In the late 90ies he has undertaken European Neurological Society Fellowship in Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland and later he gained Swiss National Science Foundation Fellowship at the same University (2003-2004).

Dr. Tsiskaridze started his professional career since late 80ies at Sarajishvili Institute of Neurology in the capacity of Junior Scientific Researcher. Later he became Senior Scientific Researcher, Head of Research Department and finally held the position of Scientific Director.

Dr. Tsiskaridze is the author of 53 scientific articles. He has received numerous international and local degrees, awards and honors including the degree of Candidate of Medical Sciences (PhD), the degree of Doctor of Medical Sciences, Sarajishvili Medal and Honour Diploma for Achievements in Neurological Research of Georgian Association of Neurologist and Neurosurgeons, Young Investigator's Award of the European Stroke Council, Bruce Schoenberg International Award in Neuroepidemiology of the American Academy of Neurology, Georgian National Scientific Prize and Silver Medal for the Cycle of Papers on Cerebrovascular Disorders, Order of Merit of President of Georgia.

Prof. Tsiskaridze is the member of Board of Directors and Founding Fellow of European Stroke Organization, member of Scientific Panel on Stroke of the European Academy of Neurology, member of Board of Directors of Curatio International Foundation.

He is a member Editorial Board of various journals including European Neurology (Karger Publishes) and European Stroke Journal (Sage Publishers). He serves as a peer-reviewer of Journal of Neurology, Neurosurgery and Psychiatry, Stroke, Journal of Neurological Sciences, Internal and Emergency Medicine, Neuroepidemiology, Cerebrovascular Diseases, European Neurology, Frontiers in Neurology, Journal of Neuroinflammation, Journal of Stroke and Cerebrovascular Diseases, and Case Reports in Neurology.

**Otar Toidze**

MD, PhD, ScD, Professor

Key qualifications:

- 1998 – Certificate of The Trainer of the Epilepsy Academy of the International League Against Epilepsy
- 1966-1972 – Tbilisi state Medical University, MD

Relevant work experience:

- 2015-present University of Georgia, Full professor
- 2012-2014 – Medical doctor and Chief Adviser at the Institute of Neurology and Neuropsychology
- 2004-2012 - Member of the Parliament, Chairmen of The Committee of Health and Social Issues
- 2005-2015 Member of European Federation of Neurological Sciences
- 2005-2010 – An international study "Prevalence of Epilepsy and antiepileptic Treatment Gap in Georgia" – Principal Investigator
- 2005 Honorary title of the World Medical Association - "Most Carrying Physician of World 2005"
- 2003 Golden medal and Honorary title of the Ministry of Health of Georgia -"The best doctor of Georgia 2003"
- 2000-2004 – An international multicentre study "An International Antiepileptic Drugs and Pregnancy Registry" – National Coordinator
- 2000-2004 rector of the institute of traditional and classical medicine
- 1994-2000 prorector of The institute of traditional and classical medicine
- 1973-2004 - Medical doctor and Scientific Fellow at the Institute of Clinical and Experimental Neurology
- 1999-2004 Fellow of Royal Medical Society, UK
- 1996-2015 - Vice-President of the Georgian League Against Epilepsy

**Members of the Editorial Board:**

**Ramaz Urushadze**
MD

Key qualifications:

- ◊ 2002 - Annual Partnership, Washington, DC, USA
- ◊ 2000 – Medical Quality (Holland Prophylactic and Health Organization)
- ◊ 2000–Global Strategies of Cancer Control (National Association of Cancer Control-NACC)
- ◊ 1999 – Partners for Healthy Communities (AIHA, USAID)
- ◊ 1999 - Public Health Administration (Japan International Corporation Agency - JICA)
- ◊ 1998 - Multi Sectoral Course for Officials, Producers and other Stakeholders in Financing Macronutrient Malnutrition (Program Against Macronutrient Malnutrition, Emory University, Atlanta)
- ◊ 1997 - American International Health Alliance (AIHA)
- ◊ 1995 - Information for Action Workshop on Case Based Surveillance (CDC USA)
- ◊ 1993 – Technical Cooperation Program (USAID) Executive Program in Health Financing (Management Sciences for Health) Boston, USA
- ◊ 1978-1981 - Postgraduate Studies
- ◊ Proctologic Institute of Moscow (Moscow, Russia)
- ◊ 1965-1971 - Graduate Diploma
- ◊ Second State Medical Institute of Moscow (Moscow, Russia)

Relevant work experience:

- ◊ Since 2008 – Affiliated Faculty in the Department of the Health Administration and Human Resources of the Panuska Collage of Professional Studies. The University of Scranton. Scranton, PA, USA.
- ◊ Since 2006 - Head of the Regional Department, National Centre for Disease Control and Public Health (Tbilisi, Georgia)
- ◊ Since 2006 - Professor; Coordinator of the Master's Program "Public Health Management", Lectures in Public Health and Health Policy, Managing the Modern Hospital and Managing Human Resources in Healthcare, University of Georgia (Tbilisi, Georgia)
- ◊ 2004-2006 - First Deputy Head of the Dmanisi Municipality (Dmanisi, Georgia)
- ◊ 1998-2004 - Tbilisi State University (TSU), Head of the Public Health Department
- ◊ 1997-2004 - Head of Public Health Department. Ministry of Labour, Health and Social Affairs of Georgia
- ◊ 1995-1997 - Deputy Minister; Head of the Public Health Department, Ministry of Health of Georgia
- ◊ 1993-1995 - Head of Health Care Organization and Regional Management Department, Ministry of Health of Georgia
- ◊ 1986-1993 - Chief Doctor of the Dmanisi Region (Dmanisi, Georgia)

**Otar Vasadze**
MD, PhD, Professor

Key qualifications:

- ◊ Qualified as Medical Doctor in 1976 at Tbilisi State Medical University, Tbilisi, Georgia
- ◊ Defended PhD in 1982 at Institute of General Pathology, Moscow, Russia
- ◊ Affiliated Faculty in the Department of Health Administration and Human Resources, University of Scranton, Scranton, PA, USA from 2000
- ◊ Licensed as Specialist in Public Health and Health Management in 2003
- ◊ Professor in the School of Health Sciences and Public Health, University of Georgia, Tbilisi, Georgia from 2007

Relevant work experience:

- ◊ Professor of Health Management, University of Georgia: 01.11.2007 -
- ◊ Associated Professor of Health Management, University of Georgia: 01.02.2005 - 01.11.2007
- ◊ Director of National Institute of Health of Geprgia: 01.05.2003 – 02.08.2004
- ◊ Director of National Health Management Center of Geprgia: 10.06.1997 – 30.04.2003
- ◊ Deputy Director of National Health Management Center of Geprgia: 01.07.1995 – 10.06.1197
- ◊ Head of Department of Primary Health Care and Continuous Medical Education Informatization of Institute of Informatics and Complex Automation in Health: 21.11.1994 – 01.07.1995
- ◊ Head of Scientific-Research Department of Tbilisi State Medical University: 01.13.1989 – 21.11.1994
- ◊ Head of the Group of Surgical Treatment of Institute of Cardiology: 01.07.1983 – 01.13.1989
- ◊ Junior Scientific Researcher of Institute of Surgery: 01.04.85 - 01.08.96

Author and co-author of 45 articles, 4 textbooks, 3 books and 1 dictionary, in total 53 publications.

**Members of the Editorial Board:**

**Mariam Margvelashvili**
DDS, MSc, PhD

Dr. Margvelashvili received her DDS from Tbilisi State University, Georgia in 2007. She earned her Master of Science in Dental Materials from the University of Siena, Italy in 2009. She defended her PhD at the Tuscan School of Dental Medicine, University of Siena, Italy in 2013. Between the periods of 2009-2011 she was a Post-Doctoral Associate at Tufts University, Boston, USA implementing research on Stem Cells. She became a Professor and the Head of the Department of Dental Medicine at the University of Georgia in 2013. Currently, she implements her ITI Program at the department of Prosthodontics and Operative Dentistry, Tufts University, Boston, USA.
Dr. Margvelashvili has lectured both nationally and internationally in Continuing Education (CE) Courses. Since 2013 she is an FDI CE Program Speaker in Eastern European countries.
Dr. Margvelashvili has both published numerous scientific articles as well as serves as a reviewer for international journals.

**Davit Tophuria**
MD, PhD, Associate Professor

Key qualifications:
- ◊ Qualified as Medical Doctor DAUG University Georgia 2004
- ◊ Defended my PhD in 2007 at Tbilisi State Medical University, Georgia
- ◊ Licensed as Specialist in Clinical Toxicology 2007

Work experience:
- ◊ Assoc. Professor of Human Normal Anatomy Tbilisi State Medical University
- ◊ Assoc. Professor of Human Normal Anatomy University of Georgia
- ◊ Head of International Students education at Tbilisi State Medical University
- ◊ International Faculty member of IASGO

Author/co-author 61 International Publications, 2 Books

**Managing Editors:**

**Julieta Andguladze**

Juliette Andghuladze has completed her first degree at Shota Rustaveli State University (Batumi, Georgia) on the West-European Languages and Literature, and her MA at The University of Georgia (Tbilisi, Georgia) on the Media Management. She holds the position of Head of Editorial Department of The University of Georgia. Her interest focuses on the editorial style issues in the Georgian periodicals - scientific journals, books. Her work experience counts 9 years in publishing industry.

**Besik Lukhutashvili**

Besik Lukhutashvili has graduated from the Tbilisi State Institute of Foreign Languages. His specialization is philologist in English language. He has good experience of translating and editing scientific articles, treatment guidelines and protocols, legislative documents related to health care, etc. He has worked at Publishing House Diogene as texts editor. At present he holds the position of Head of International Training Center at the School of health Sciences and Public Health of the University of Georgia.

**George Lobzhanidze**
MD, PhD(c)

Graduate of Aieti Medical School. He has pursued PhD education at Tbilisi State University and University of Tromsø. Professional experience includes clinical medicine (Cardiology, Interventional Cardiology, Internal Medicine, Emergency Medicine), health administration, project management, teaching and medical research. Currently he holds a position of Clinical Director at Medalpha Hospital Network and delivers lectures at Tbilisi State University as an Invited Lecturer.

**Members of the International Advisory Committee**:

**Ismayil Afandiyev**
MD, PhD, Associate Professor


Key qualifications:
- ◊ 1990–1996, Azerbaijan Medical University, Faculty of general practice, Baku, Azerbaijan, Diploma of Physician (MD)
- ◊ 1996–1998, Azerbaijan Medical University, Sub-faculty of Internal Medicine, Baku, Azerbaijan, Clinical Medicine Chief Resident Certificate
- ◊ 1999, Azerbaijan State Refresher Institute, Sub-faculty of Anesthesiology and Intensive Care ,Baku, Azerbaijan, Certificate of Licensed Specialist in Medical Intensive Care and Anesthesiology
- ◊ 1998-2001, Azerbaijan Medical University, Sub-faculty of Internal Medicine, Baku, Azerbaijan, Candidate of medical science (PhD) Academic Degree Diploma

Relevant work experience:
- ◊ 2015-present, Azerbaijan Medical University, Dean of International Students
- ◊ 2014–2015, Azerbaijan Medical University, Vice-Dean for Postgraduate Education
- ◊ 2014-2015, Baku-2015 European Games, General Practice and Public Organizing Committee, Health Manager
- ◊ 2013, WHO Mission on preparation Baku-2015 European Games, Expert
- ◊ 2010- present, Azerbaijan Medical University, Sub-faculty of Internal Medicine, Baku, Azerbaijan, Associate Professor
- ◊ 2002-2009, Azerbaijan Medical University, Sub-faculty of Internal Medicine, Baku, Azerbaijan, Assistant Professor
- ◊ 2008-present, Baku City Health Authority, Chief toxicologist
- ◊ 2006-present, Azeri Toxicologists Society, Chairman
- ◊ 2000- 2008, Medical emergency aviation service MoH, Adviser
- ◊ 1996-present, Center of Clinical Toxicology MoH, Baku, Azerbaijan, Senior Staff Physician

**Margarita Beglaryan**
MD, PhD

Key qualifications:
- ◊ 2016, Training on Capacity Building for Implementing bologna reforms
- ◊ 2015, Training course on GCP, Basic course Training on GCP
- ◊ 2014, ISPOR short course "Use of Instrumental Variables in Observational Studies of Treatment Effects", Holland
- ◊ 2013, Training course on GDP
- ◊ 2012, Training course on Good Laboratory Practice, Good Pharmaceutical Practice (under supervision of a visiting lecturer from Holland and Finland)
- ◊ 2010, "Basics of Phytotherapy"
- ◊ 2009, USAID/CAPS HealthStar Training course on GMP (under supervision of visiting lecturers from USA, Great Britain, Germany)
- ◊ 2004, Psychology and Pedagogic course, YSMU
- ◊ 2002 –2005, Economical research institute of finance and economics
- ◊ Degree: Doctor of Economic Science
- ◊ 1998, Training of rational usage of medicine, WHO/EURO, MH of RA
- ◊ 1981-1986, Faculty: Pharmacy, YSMU, Degree: Honors Diploma of Pharmacist.

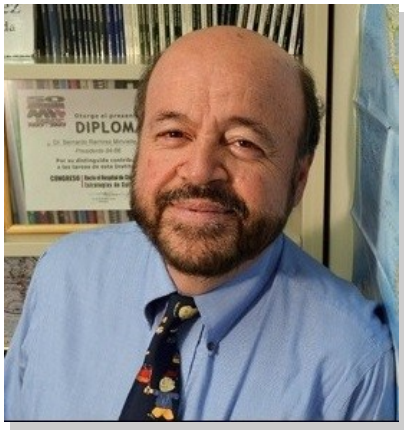
Relevant work experience:
- ◊ 2010, Current Head of Department of Pharmaceutical Management, YSMU
- ◊ 2008, Doctor of Economic Science
- ◊ 2007 – 2010, Head of Education Part, Department of Pharmaceutical Economics and Management, YSMU
- ◊ 2007-2008, Research work on Consumer protection and Healthcare in EU course preparation in Armenian Universities in Soros project
- ◊ 2002 – 2005, Researcher, Economical research Institute of Finance and Economics
- ◊ 1996 – 2011, General Manager, Carma Pharm Pharmaceutical Company CJSC - Yerevan
- ◊ 1990 – 2007, Assistant Professor, Department of Technology Drugs and Pharmaceutical Economics, YSMU
- ◊ 1986 – 1990, Senior Laboratory Assistant, Department of Technology Drugs and Pharmaceutical Economics, YSMU

**Members of the International Advisory Committee**:

**Michael J. Costello**

Michael M. Costello currently serves as a consultant to the Moses Taylor Foundation. He is a fellow of the American College of Healthcare Executives. Mr. Costello holds a Bachelor of Science, Master of Arts, Master of Business Administration and Juris Doctrate degrees. His teaching and publising interests are in the areas of health law and policy, health economics, international health care, long term care administration and clinical and administrative ethics. Mr. Costello is a faculty member in the Deparment of Health Administration and Human Resoucres and is the Program Director of the Graduate MHA Online program. Mr. Costello holds adjunct faculty appointments at Marywood University, Misericordia University and The Commonwealth Medical College. He also holds visiting professorships at Trnava and St. Elizabeth Universities in Slovakia and the University of Georgia in Tbilisi, Republic of Georgia. At the University of Scranton, he is a member of the order of Pro Deo et Universitate. He is a faculty inductee of Alpha Epsilon Alpha Communications Honor Society and Upsilon Phi Delta Honor Society for Health Care Administration. He is also an honorary inductee of Pi Aplha Alpha public administration honor society at Marywood University. He also received the Faculty Service Award from Hanley College and the Provost's part-time Faculty Award for Teaching Excellence at the University of Scranton as well as the University's Frank O'Hara Award for university service. He is a member of the Board of regents at the University of Scranton and formerly served as President of the University of Scranton Alumni Society. Mr. Costello has published numerous articles and professional publications. He has also made a number of academic presentations to professional organizations and academic societies. He is a member of the editorial Advisory board of the Haworth Press, Inc., the publishers of several health care journals as well as the editorial boards of the Journal of health Management and Public Health, published by the Health Management Institute at the University of trnana, Slovak Republic and the Journal of Health Sciences Management and Public Health, published by the National Institute of Health, Tbilisi, republic of Georgia. He formerly served as President of the Healthcare Management Forum, a regional affiliate of the American College of Healthcare Executives, and received the senior level Regents Award for the Northeastern Pennsylvania region of ACHE. Mr. Costello retired from the U.S. Army Reserve with the rank of Lieutenant Colonel and is a graduate of the U.S. Air Force Air War College.

**Bernardo Ramirez**
MD, MBA



Bernardo Ramirez is the Director of the Executive Master in Science in Health Services Administration Program (e-MSHSA) and of Global Health Initiatives of the Department of Health Management and Informatics at the University of Central Florida, where he teaches the US Health System; International Health Systems; Issues and Trends in the Health Professions; Quality Improvement; Leadership and Organizational Behavior; and Strategic Planning in the graduate and undergraduate programs.

He is actively engaged in the promotion of minority health, diversity and cultural competency. Dr. Ramirez is an experienced health services Administrator in public and private organizations including clinical and administrative practice from the hospital departmental level to health systems reform, planning and policy.

He has provided technical assistance, developed research and conducted training under the auspices of the U.S. Agency for International Development, the Pan American Health Organization, The World Health Organization, The International Hospital Federation, The World Bank, The Inter-American Development Bank and the W.K. Kellogg Foundation for 35 years in more than 60 countries in 5 continents.

Among other positions, he has been General Director of Health Standards of the Ministry of Health of Mexico; President of the Mexican Hospital Association; Vice-President and Director of International Programs and currently a Member of the Board of Directors of the Association of University Programs in Health Administration (AUPHA) and Member of the Candidacy Committee of the Commission on Accreditation of Healthcare Management Education (CAHME).

He is the author of numerous publications, training materials and presenter in many national and international forums. He has served as a Rotarian, in the board of the Celebration Foundation and on SHARES International Florida Hospital Foundation.

**Members of the International Advisory Committee**:

**Hernan Fuenzalida-Puelma**

Hernán L. Fuenzalida-Puelma, Esq. LL.M (Yale University) is a citizen of the United States of America and Chile, is a lawyer with extensive international experience in 56 countries in policy and regulation, health financing and insurance, and institutional development. Recent publications include "Moving toward Universal Health Coverage in Social Health Insurance in Vietnam" with Aparnaa Somanathan, Ajay Tandon, Huong Lan Dao, and Kari L. Hurt, World Bank, Washington, DC, 2014. He is a member of Bar Associations of Santiago, Chile, and Costa Rica; editorial Board of *Hepatology, Medicine and Policy* (HMAP), and of The World Progress Center, Inc.

**Zurab Guruli**
MD, PhD, Associate Professor

Education:

- ◊ Tulane University Medical Center, New Orleans, LA, Fellow (Cardiovascular Anesthesia), 2004, Resident; Department of Anesthesiology, 2004
- ◊ Grand Rapids Medical Education & Research Center and Michigan State University Grand Rapids, MI, Intern, Preliminary General Surgery, 2000-2001, Certificates: Fundamental Critical Care Support
- ◊ Louisiana State University School of Medicine New Orleans, LA, Visiting Scholar for Research in Pediatric Surgery, 1995-1996
- ◊ Tbilisi Medical Academy, Candidate of Medical Science (PhD), 1995
- ◊ Tbilisi State Medical University, Tbilisi. Georgia, MD, 1991

Honors:

- ◊ President, Georgian-American Medical Association (GAMPHA)
- ◊ Chief Medical Advisor, Chairman of Georgian International Physicians Scientific Council; Ministry of Health, Georgia, 2011– Present
- ◊ Clinical Manager of the Year, 2015, VA Medical Center
  Presidential Order of Honor , 2012, Republic of Georgia
- ◊ Clinical Manager of the Year, 2008, VA Medical Center
  Doctor of the Year 2007, VA Medical Center, Teacher of the Year 2007, CRNA School, University of Mississippi
- ◊ Special Contribution Award, VA Medical Center, Jackson, 2006
- ◊ Special Contribution Award for Hurricane Katrina Rescue Operations, VA Medical Center, New Orleans, 2005
- ◊ Tulane University Department of Anesthesiology, Chief Resident 2003-2004
- ◊ Tulane University Department of Anesthesiology, Outstanding resident 2003-2004
- ◊ Tulane University Department of Anesthesiology, Outstanding Resident 2002-2003
- ◊ Tulane University Department of Anesthesiology, Outstanding Junior Resident 2001-2002

Certification:

- ◊ American Board of Anesthesiology, Diplomate (certificate# 40786)
- ◊ ECFMG Certification

Relevant work experience:

- ◊ 2015-Present VA Medical Center, Acting Chief, Department of Surgery
- ◊ 2005–Present VA Medical Center, Chief, Anesthesiology Department Jackson, MS Director, SICU
  2015–Present University of Mississippi, Jackson, MS, Associate Professor
- ◊ 2006–2015 University of Mississippi, Jackson, MS, Assistant Professor
- ◊ 2004–2005 VA Medical Center, New Orleans, Anesthesiologist
- ◊ 2004-2005 Tulane University Clinical instructor, Department of Anesthesiology
- ◊ 1997-2000 St. Philip Clinic Vacherie, LA, Research Assistant
- ◊ 1996-1997 Tbilisi State Children's Hospital Tbilisi, Georgia, Pediatric Surgeon
- ◊ 1995-1996 New Orleans Children's Hospital, New Orleans, Research Assistant
- ◊ 1992-1995 Tbilisi State Children's Hospital Tbilisi, Georgia, Pediatric Surgeon
- ◊ 1994-1995 Tbilisi Children's Outpatient Clinic # 10 Tbilisi, Georgia, Pediatric Surgeon
- ◊ 1991-1992 Tbilisi Children's Hospital # 2, Tbilisi, Georgia, Pediatric Surgeon

**Members of the International Advisory Committee**:

**Artashes Tadevosyan**
MD, PhD, DMS

Artashes Tadevosyan received his MD in preventive medicine from Yerevan State Medical University, Armenia, in 1978. In 1986 he earned his PhD from the Institute of Occupational Hygiene and Professional Diseases, Kiev, Ukraine. In 2007 he completed his Doctor of Science in Medicine (Public Health) at the National Institute of Health, Yerevan.
Dr. Tadevosyan holds is professor in the Department of Public Health and Healthcare at Yerevan State Medical University. His research interests include toxicology of pesticides and industrial chemicals, safe farming, rural health, and the epidemiology of non-communicable diseases. He is active in health promotion, agricultural safety, smoking cessation, and promoting palliative care in Armenia. Dr. Tadevosyan is author of more than 100 published articles and numerous standards for pesticides residue and TLVs for the use of hazardous chemicals.

**Daniel J. West, Jr.**
PhD, FACHE, FACMPE, Professor

Dr. West is the Chairman and Professor in the Department of Health Administration and Human Resources, University of Scranton. He teaches in the Graduate School at the University of Scranton and has specialized in global health management, international accreditation, globalization, multiculturalism, health care leadership, and diversity management. He holds a Professor in Public Health appointment at Trnava University, Slovakia; a Visiting Professor appointment at the University of South Bohemia, Czech Republic; and a Visiting Professor appointment at the University of Matej Bel and St. Elizabeth University in Slovakia. He has an Affiliated Faculty appointment at Tbilisi State Medical University, Department of Public Health and Health Management, Tbilisi, Georgia and at the University of Georgia, School of Health Sciences & Public Health, Tbilisi, Georgia. Dr. West has an Affiliated Research Professor appointment at the Center for International Health Services Research and Policy at Washington State University. Recently he was appointed Adjunct Faculty in the Department of Medicine, The Commonwealth Medical College in Scranton, Pennsylvania. In 2011 he was awarded an Honorary Professor at St. Elizabeth University of Public Health College of Health and Social Sciences. In 2007 Dr. West received an Honorary Doctorate of Public Health (Dr.h.c.) from St. Elizabeth University in Health and Social Sciences for his international leadership. He is President and Chief Executive Officer of HTC Consulting Group, Inc. Dr. West received his master and doctoral degrees from the Pennsylvania State University. Dr. West is board certified in healthcare management by the American College of Healthcare Executives. He is a dedicated and hardworking teacher, consultant and scholar who has achieved success and been recognized for his accomplishments in international healthcare projects and activities in Central Europe, Haiti, Slovak Republic, Eurasia, Mexico, Brazil, and Caribbean. He is recognized as in International Fellow at the University of Scranton and serves as Co-Director and Co-Founder of the Center for Global Health and Rehabilitation. Each year Dr. West conducts study abroad tours for graduate MHA students to CEE countries and to Central & South America. Dr. West has been a CEO for a hospital, medical practice and several health care businesses. In addition to 41 years of health care management, consulting and leadership experience, Dr. West maintains Fellowship with the American College of Healthcare Executives, American College of Medical Practice Executives, American College of Health Care Administrators, American Academy of Behavioral Medicine, and Association of Behavioral Healthcare Management. He serves on the Board of Directors for the Eastern Pennsylvania Healthcare Executive Network and the EPAHEN Program Planning Committee. Other Board memberships include the Healthy Northeast Pennsylvania Initiative, Penn State Graduate School Alumni Society, Medical Advisory Board of the International Brain Trauma Association, Wright Center for Graduate Medical Education IRB, the Behavioral Health Research Institute, and Susan G. Komen for the Cure, Northeastern Pennsylvania Affiliate. Recently he was appointed to the Board of Trustees of Moses Taylor Hospital (CHS) an Affiliate of Commonwealth Health. He serves as Chairman of the Board of Directors of the Commission on Accreditation of Healthcare Management Education (CAHME) and also serves on the Executive Committee, Strategic Issues Committee, Governance Committee, Finance & Audit Committee and Executive Committee. Serving as a member of numerous national/international boards and committees, Dr. West has authored over 281 articles dealing with various aspects of health services administration and leadership. He serves on 30 editorial committees and has over 539 presentations at regional, national and international conferences. Current research efforts focus on international accreditation and global health management education partnerships.

**Caucasus Journal of Health Sciences and Public Health**
*Official journal of the University of Georgia and Iv.Javakhishvili Tbilisi State University*

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Journal supplements consist of:
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**I. Article**

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Articles MUST comply with the formatting of the journal:
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Line spacing: 1.0
Left aligned-No TABS
Tables with all borders (rows and columns)
FIGURES in high resolution
AMA or APA or NLM style.

**First page must include:**

Title of an article: should be centered at the top of page

(the title is not underlined or italicized) 11-pt Times New Roman
Author's names (Full name, middle name and surname)
Author's information (academic degrees, workplace and position)
Abstract

**Paper Layout**

- ◊ Summary
- ◊ Introduction
- ◊ Methodology
- ◊ Results
- ◊ Discussion
- ◊ Conclusions
- ◊ Acknowledgement
- ◊ References
- ◊ Abbreviations

**2. Summary**

Summary must be no longer than 300 words. Do not include abbreviations, references or footnotes in the Summary. The Summary must have four sections:

- ◊ **Background/Aims**, outlining precise purpose of the paper
- ◊ **Methodology,** giving a brief description of materials used a concise explanation of the methods
- ◊ **Results,** providing a summary of the findings **Conclusions,** explaining the significance of the work.
- ◊ **Keywords.**

**3. Sections**

**A. INTRUDUCTION** The introduction should give brief background information and state the reasons and purposes behind the study.

**B. METHODOLOGY** This section must give sufficient information to permit detailed evaluation and duplication of the work by other investigators. Ethical guidelines followed must be described. If applicable, the approval of institutional human subject research review committees or animal welfare committees should be cited. An outline of the statistical methods should be included here.

**C. RESULTS** In this section, the findings of the work should be presented. Use tables and figures where appropriate to improve the clarity of the presentation.

**D. DISCUSSION** Discuss the results in relation to other published works in the same field. Offer explanations for any differences between the presented work and previous studies. Identify hypotheses and speculation clearly.

**E. ACKNOWLEDGEMENT**

**F. REFERENCES (**AMA or APA style**)**

**4. Language**

The standard language of the journal is English. Any manuscripts which are considered by discretion of the editor as requiring language correction will not be accepted for publication until professional language correction has been performed.

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**5. Abbreviations**

The first appearance in the text should be written in full, with the abbreviation given afterwards in parentheses. Subsequently, only the abbreviation should be given.

6. **Numbers**

A number in the beginning of a sentence should be written in full. Otherwise, a number should be given in digit form.

Example: The control group included 100 subjects (65 men and 35 women). Forty-five of them were healthy volunteers (25 men and 20 women).

There should be no space between numbers and mathematical symbols or measurement values.

Example: 33%; $p<0.001$; 1.5cm; $2770x10^3/L$

**7. References** See AMA or APA or NLM style.

**8. Tables and Figures**

- ◊ Should be numbered in order of presentation in the text.
- ◊ Must be part of the text (Should not be in separate word file or below the text).
- ◊ Mustn't be split, should be part of one page.

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Author's names (Full name, middle name and surname)
Author's information (study place and position)
Supervisor's name (Full name, middle name and surname)
Supervisor's information (academic degrees, workplace and position)

**Review**

Review must be no longer than 500 words**.** Do not include references or footnotes in the review. The Review must have next sections:

- ◊ **Summary** outlining precise purpose of the paper
- ◊ **Overview** main part of theme
- ◊ **Conclusions** explaining the significance of the work.
- ◊ **Keywords**
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**III. Conference Abstract**

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Thesis

**Abstract**

Abstract must be no longer than 400 words. Do not include references or footnotes in the abstract. The abstract must have next sections:

- ◊ **Background/Aims**, outlining precise purpose of the paper
- ◊ **Methodology,** giving a brief description of materials used a concise explanation of the methods **Results,** providing a summary of the findings
- ◊ **Conclusions,** explaining the significance of the work.
- ◊ **Abbreviations** (If needed)
- ◊ **Keywords**

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# The Code of Doctor's Professional Conduct

Givi Javashvili[1], Guram Kiknadze[2], Irina Karosanidze[3], Tamar Gabunia[4], Revaz Tataradze[5], Giorgi Tsilosani[6]

[1]MD, PhD, Georgian Health Law and Bioethics Society; [2]MD, PhD, Association of Family Doctors of Georgia; [3]MD, PhD, Georgia Family Medicine Association; [4]MD, PhD, Georgia Family Medicine Association; [5]MD, PhD, Georgian Medical Association; [6]MD, PhD, Georgian Medical Association

"...Despite the richness of the country in natural resource, if human rights and duties are obscure, unclear and disputable, the success and welfare of local population will daily grow worse or be definitely impeded."

*Ilia Chavchavadze*
*"The Life and the Law," Iveria Newspaper, #1, 1877*

## Introduction

The rule of law, respect for human rights, adherence to ethical norms and rules of conduct represent prerequisites for the establishment of civil society and reaching progress and welfare in every area, including the health care.

Understanding and application of legal provisions, universally recognized ethical principles and code of conduct serves as the foundation for successful and dignified medical practice as well as ensuring the high quality medical care. This can be achieved by developing a manual, which would set forth the principles and the rules of relationship with a patient, his/her family members and close people, colleagues, students, resident physicians as well as with the representatives of media, law enforcement bodies, medical and pharmaceutical industry, etc.

The above mentioned has determined the need for the development of present "Code of the Doctor's Professional Conduct". In particular, the document shall ensure the following:

- ◊ Protection of supremacy of patient's interests while performing a doctor's duties;
- ◊ Optimal standardization of communication skills among the doctors;
- ◊ Making the right decision in cases, when a doctor faces legal and ethical dilemmas such as informing a patient about lethal disease diagnosis or relationship with prisoners, termination of life support, definition and implementation of action strategy after determining brain death, human organ procurement and transplantation, etc.

The Code of the Doctor's Professional Conduct is based upon the regulations provided by the healthcare legislations of Georgia, as well as the principles defined under the Doctors Code of Ethic of Georgia and recommendations by international organizations concerning rights and responsibilities of a doctor and a patient.

The recommendations provided under the Code of the Doctor's Professional Conduct which are based upon the requirements specified under Georgian legislation are of binding nature.

To the extent possible, the government shall support the implementation of the recommendations provided under the Code of the Doctor's Professional Conduct by creating relevant environment at medical facilities and motivating doctors.

Community of doctors and professional associations shall play the major role in the implementation of the given recommendations. The recognition of the recommendations by the members of such associations and their implementation can be considered as one of the criteria for professional medical association's membership.

* * *

In the late 90's the newly independent country of Georgia started the development of healthcare legislation regulating doctor's professional practice and patient's rights in accordance with the legal and ethical standards recognized by international societies.

Since 1999 the staff of Healthcare Legislation and Bioethics Department of the National Healthcare Management Center, as well as the members of the Georgian Health Law and Bioethics Society launched their effort to elaborate a draft of Doctor's Code of Ethics of Georgia. On May 6, 2003 the First Congress of Georgian Physician approved the Doctor's Code of Ethics of Georgia.

The USAID Health System Support Program (HSSP) initiated the development of the Code of the Doctor's Professional Conduct. On July 5, 2010 HSSP signed a memorandum on the development of the Code of the Doctor's Professional Conduct with the following non-governmental organizations: **Georgian Health Law and Bioethics Society, Association of Family Doctors of Georgia, Georgia Family Medicine Association, Georgian Medical Association** and **National Association of Cancer Control**.

The representatives from the above listed organizations created a working group with the following composition: Givi Javashvili (Chairman of the Working Group and a representative of the Georgian Health Law and Bioethics Society), Guram Kiknadze (Association of Family Doctors of Georgia), Irina Karosanidze and Tamar Gabunia (Georgia Family Medicine Association), Revaz Tataradze and Giorgi Tsilosani (Georgian Medical Association).

The work on the first draft of the Code of the Doctor's Professional Conduct was finalized in December 2010. The public review of the Code of the Doctor's Professional Conduct was launched from January 2011.

The final version of the document was developed in April 2011 based on the feedback and recommendations received as a result of public review.

The Code of the Doctor's Professional Conduct was prepared without any remuneration by the goodwill of representatives from the above listed organizations.

## 1. GENERAL PROVISIONS

### 1.1. THE GOAL OF THE CODE OF DOCTOR'S PROFESSIONAL CONDUCT

The goal of the Code of the Doctor's Professional Conduct is to support the compliance of doctor's professional practice in Georgia with widely recognized professional, ethical and legal standards in order to ensure the following:

- ◊ Improving the quality of medical care;
- ◊ Patient's protection;
- ◊ Creating the environment between a doctor and a patient that is favorable for the establishment of mutual trust and partnership;
- ◊ Strengthening the doctor's image.

### 1.2. THE SCOPE OF THE CODE OF DOCTOR'S PROFESSIONAL CONDUCT

The Code of the Doctor's Professional Conduct is designed for doctors working in Georgia, as well as for any individual performing the duties of a physician, such as: resident physicians, doctoral candidates and medical students.

It is also desirable that other healthcare professionals apply the Code of the Doctor's Professional Conduct. However, their professional practice might by regulated by rules of conducts specially designed for their area of work.

The Code of the Doctor's Professional Conduct might be interesting for general public as well, since the latter should have good understanding and knowledge of doctor's professional practice.

### 1.3 PRINCIPLES OF THE CODE OF DOCTOR'S PROFESSIONAL CONDUCT

The Code of the Doctor's Professional Conduct is based upon the internationally recognized and locally accepted values and views concerning doctor-patient relationship, health care, human rights and doctors professional practice. At the same time, the rules were developed in accordance the Doctor's Code of Ethic of Georgia, providing the fundamental ethical principles for doctor's professional practice in Georgia.

The Code of the Doctor's Professional Conduct includes the provisions defined under the following national and international documents having binding or declarative nature and aiming at legal and ethical regulation of doctor's professional conduct:

a) The Law of Georgia on Medical Practice (2001), the Law of Georgia on Patient's Rights (2000) and the Law of Georgia on Health Care (1997); as well as the laws regulating the specific fields of healthcare, such as: the Law on Public Health (2007), the Law on HIV/AIDS (2009), the Law on Psychiatric Care (2006), the Law on Human Organ Transplantation (2000), etc;

b) Legal instruments of the Council of Europe in the fields of healthcare, biomedicine and human rights, including the Convention on Human Rights and Biomedicine (1997) and its additional protocols;

c) World Health Organization Declaration on the Promotion of Patient's Rights in Europe (1994);

d) The United Nations Educational, Science and Cultural Organization (UNESCO) Universal Declaration on Bioethics and Human Rights (2005), United Nations Principles of Medical Ethics (1982);

e) The World Medial Association International Code of Medical Ethics (1949) and declarations including Declarations of Geneva, Lisbon, Helsinki, Tokyo, Hamburg, etc.

### 1.4. THE GENERAL PRINCIPLES OF DOCTORS' PROFESSIONAL PRACTICE

1.4.1. FUNDAMENTAL PRINCIPLES OF MEDICAL ETHICS

While providing medical care to a patient, a doctor's activities and decisions shall be based upon the following four fundamental principles of medical ethics:

**a) Respect for patient's autonomy** – Respect for patient's views and decisions; support of a patient in making an informed and independent decision;

**b) Beneficence ("Doing Good")** – Making a decision that is the most beneficial for patient's life and health;

**c) Non-Maleficence ("Do Not Harm")** – Avoiding harming to a patient. Almost every medical procedure is related to certain harm. However, the expected benefit should always exceed the possible harm; it should be a duty of a doctor to minimize such harm;

**d) Justice** – Equal distribution of benefit, risk and burdens; a fair attitude towards the patients that are in equal conditions; on the other hand, taking into consideration the health needs of a patient while distributing scarce resources.

#### 1.4.2. THE PURPOSE OF A DOCTOR'S PROFESSIONAL PRACTICE

The purpose of doctor's professional practice is to ensure the good health of an individual, a family or society at large; to maintain and restore their health and alleviate a suffering of a human being.

**1.4.3 PROFESSIONAL INDEPENDENCE**

A doctor shall be free and independent in making his/her professional decisions. He/she shall be guided by professional and widely recognized ethical standards only.

The doctor shall use all his/her efforts to stand against an action that contradicts with the principles and ethical rules defined under the Code of the Doctor's Professional Conduct.

**1.4.4 PROFESSIONAL COMPETENCE**

A doctor shall seek to upgrade and maintain professional competence (such as knowledge, skills and conduct) in his/her field in accordance with locally accepted standards. The doctor shall conduct his/her practice within his/her field of competence.

Moreover, a doctor shall decline from the provision of medical care, which, by his/her judgment, is beyond his/her knowledge and skills at the given moment though it falls under his/her area of study.

**1.4.5 UNDERSTANDING AND UPHOLDING THE LEGISLATION**

A doctor shall understand and uphold the local legislation regulating medical practice. Moreover, a doctor shall strive to facilitate the amendment and modification of those provisions of the law that, by a doctor's opinion, contradict a patient's and society's health interest and prevent a doctor from adhering to professional and ethical standards.

**1.4.6 REPUTATION OF THE PROFESSION**

Maintaining a good image and respect in doctor's profession is mandatory for doctor's practice. First and foremost it can be achieved through decent professional conduct, adherence to ethical and professional standards, good working relation with other colleagues and care about the patient and society healthcare interests.

**2. SPECIFIC PROVISIONS**

**2.1. DOCTOR-PATIENT RELATIONSHIP WHILE PERFORMING DOCTOR'S DUTIES**

The first consideration of a doctor shall be a patient, i.e. an individual who applies to a physician because of health problems. A physician shall always bear in mind that he/she deals with not only a disease, but a human being as well, who has his/her own values, views and expectations and is emotionally experiencing and understanding his/her sickness.

Successful medical practice requires the establishment of a doctor-patient relationship that helps building mutual trust, understanding, respect and partnership.

**2.1.1. EQUAL AND FAIR RELATIONSHIP**

Equal and fair relationship to a patient means, at one hand, elimination of any discriminations; on the other hand, taking into consideration the individual needs of a patient.

A physician shall not discriminate a patient because of his/her origin, social status, religious belief, opinion, sickness or any other features.

In addition to this, a physician, while providing a medical care, shall consider patient's individual needs that are related to his/her health as well as to his/her religious, ethnic, psychological, social and other personal needs.

**2.1.2 RESPECT FOR PATIENT'S AUTONOMY**

Respect for a patient, as a human being, definitely means the consideration of his/her thoughts, opinions and choices. Which on the other hand leads to the recognition of a patient's autonomy.

**2.1.3. SHARING OF INFORMATION**

**2.1.3.1 Sharing Information with Patient**

A patient is entitled to receive an objective, wholesome and timely information on his/her health state in a way that is clear and understandable for him/her.

Ask the patient whether he/she is willing to receive comprehensive information on his/her health condition. If the patient is willing to, provide him/her, in a way he/she can understand, with complete, objective and timely information including the following:

- Your (a doctor's) identity and expertise;
- Results of medical examinations, diagnosis and prognosis, as well as suggested preventive, diagnostic, treatment or rehabilitation options and the related risks and possible benefits;
- Alternative solutions for suggested options and their accompanying risks and possible benefits;
- Financial issues concerning the medical care, resources and routine of the medical facility.

You shall consider patient's understanding skills and avoid using unclear medical terminology while informing him/her. Make sure that a patient properly understands and evaluates information provided by you.

In case a patient is minor, you shall follow the guidelines specified under section ***2.2.1. Minors***.

In case mental health limits a patient's decision-making skills, you shall follow the guidelines specified under section ***2.2.4. Doctor and Mentally Sick Patient, With Limited Decision-Making Capacity***.

In case a patient declines to receive information, you shall follow his/her will and check with him/her to whom you can share information on his/her health state (it should be patient's close person or legal representative in accordance with section ***2.1.3.2. Sharing information with a patient's Close Persons or Legal Representatives***). If a patient declines to receive information and the lack of such information may harm the health of either the patient himself/herself or a third person whose identity is known to you, you shall by all means ensure the provision of such information to the patient.

You shall share medical records with a patient in the event the latter makes such a request.

If a patient does not speak the national language and/or a language you understand, you shall follow the legislation and medical facility routine, providing the rules of hiring and paying for an interpreter's service.

If you feel that due to language barrier you are not capable to search for comprehensive information, refer a patient to another physician who is capable to overcome such obstacle. If the referral to other doctor is not possible you should decline to provide medical care in circumstances that are stipulated by the law (See section ***2.1.13. Doctor's Refusal to Provide Medical Care; Termination of Medical Care).***

If you have grounds to assume that informing of a patient shall negatively affect his/her health condition, you should:

- ◊ Limit the volume of information or do not share the information with such patient at all;
- ◊ Do not make the above decision individually; you have to agree it with the medical ethics committee of your facility or in the absence of such body, with your colleague;
- ◊ Make an entry in patient's medical records, justifying the need of not sharing or limiting the volume of information and making relevant decision. The statement shall include a consent of a medical ethics committee or a colleague.
- ◊ In case a mentally capable patient requests the provision of wholesome information including medical records, you have the duty to make the wholesome information available to him/her (despite you decision to limit or not provide an information to a patient).

**2.1.3.2 Sharing of Information with a Patient's Close Persons or Legal Representatives**

- ◊ You shall share the information on mentally capable patient's health to his/her legal representative or a relative only in the event that you have a prior consent to do so from the patient. Moreover, the patient should name the person to whom you are authorized to share the information;
- ◊ In case the patient is mentally sick or not capable to make the decision, you shall share the information with patient's legal representative or relative.

**2.1.4 INFORMED CONSENT; RESPECT FOR PATIENT'S DECISION**

Informed consent is the prerequisite to medical intervention; it ensures the involvement of a patients in a decision-making on the medical intervention.

Patient's informed consent on certain types of medical intervention means obtaining a patient's agreement only after providing him/her with the detailed information including the following:

- ◊ Types of suggested medical intervention;
- ◊ The reason a patient needs such intervention;
- ◊ What are the expected benefits of the intervention and what kind of discomforts or complications are possible? What is the risk to patient's health and life?
- ◊ What can be consequences in case of the rejection of intended medical intervention?
- ◊ What are the alternatives for intended intervention? What is territorial and financial availability of such intervention? What are the advantages or disadvantages of alternative solution in comparison with the intended intervention?

While providing the above defined information to a patient you should communicate with him/her in a way that is understandable to him/her. You should not use difficult medical terms so that the patient can clearly understand and assess the provided information.

The necessary requirement for informed consent is patient's ability to make informed decision. In case a patient is disabled or is unable to make informed decision, you should follow the recommendations specified under sections: ***2.2.1. Minors*** and ***2.2.4. Doctor and Mentally Sick Patients With Limited Decision-Making Capacity.***

- ◊ At the same time, you should bear in mind that:
- ◊ Patient's consent on medical intervention should be independent[1];
- ◊ Georgian legislation requires written informed consent for certain types of medical interventions[2].

Written informed consent is necessary for surgeries or other invasive or high risk-related procedures (such as radiation therapy, chemotherapy, gene tests, etc. The complete list of such procedures are set forth by the Georgia Law on Medical Practice). However, you are entitled to obtain written informed consent from a patient any time you consider it necessary.

**2.1.4.1 Patient's Refusal to Medical Care**

A patient is entitled to refuse to any types of medical intervention. The law prohibits any medical interventions for a mentally sound and decision-making capable patient.

When a patient refuses to medical intervention, you shall make sure that the patient is well aware about the purpose of this intervention, its meaning, expected benefit, risk and possible outcome in case such treatment is not provided to him/her. On the other hand, you should properly evaluate patient's ability to make sound decision. The thorough evaluation of the latter is especially important when a patient refuses to an intervention that is crucial for his/her health and life.

When a patient, who is on a terminal period of incurable disease, refuses to medical treatment you should follow the recommendations specified under section ***2.2.5. Patient at End of Life; Palliative Care.***

[1]Independent consent – a consent obtained from a person without exercising any pressure or influence over him/her (such as moral, financial, etc.)

[2]Georgian Law on Medical Practice. Article 44.1

#### 2.1.4.2 Patient's Previously Expressed Wishes (Advanced Directive)

In accordance with the Georgian legislation, a citizen is authorized to previously express his/her wish in writing on the provision of medical care, in case he/she is not capable to express his/her wish (e.g.: coma).

Currently Georgia does not have a roster of patients' previously stated will (advanced directive). Therefore, you should check this with the patient's family members and close persons. In the event that such written document exists, you should follow the patient's wish concerning the provision of medical care. However, remember that this wish might not cover the termination or refusal to life-sustaining treatment, unless the patient has a disease that is lethal or may lead to severe disability.

### 2.1.5 INFORMATION CONFIDENTIALITY

Information on patient's health condition and private life is confidential. You should not disclose it neither in patient's life nor after his/her death.

Disclosure of confidential information to representatives of mass media is strictly prohibited.

Confidential information can be disclosed only if:

- ◊ A patient agrees to share information on his/her health or private life to other person(s);
- ◊ Non-disclosure of information threatens the health and/or life of a third person (whose identity is known to you);
- ◊ The information is shared with other medical personnel involved in patient's medical care;
- ◊ You have grounded doubt on a disease that is mandatory to be registered;
- ◊ A court or prosecution bodies provide written order and request provision of such information;
- ◊ It is stipulated by the respective legislation.

As it was indicated previously, you are authorized to share patient's confidential information with a colleague only if he/she is involved in the provision of medical care to this patient; e.g.: if you refer a patient to a colleague or a colleague has already been involved in the provision of medical care to him/her; moreover, you are allowed to share it with a colleague in any other circumstances when you consider his/her consultations necessary for managing medical problems of a specific patient.

At the same time, in such circumstances, you shall make sure that you are not overheard by other people (e.g. you are not in the presence of others) while talking to your colleague personally or on the phone. In addition, you have a duty to take care of medical records, as well as the information received by fax or email, records of consultations and ensure their protection so that they should not be easily accessible to strangers.

Do not share the details of a patient's private life with anyone, even after his/her death.

### 2.1.6 RIGHT TO PRIVACY

It is important for a patient to be in an isolated and secured environment within the medical facility and away from strangers' eyes while receiving medical care.

You should respect for such wish of a patient; therefore, you should not provide medical consultations or a medical procedures in the presence of other people unless the patient requests the attendance of a close person or family member or if you consider it necessary to invite and/or involve other medical personnel, students or resident physicians. In such case you have a duty to inform a patient about the invited individual, explain the purpose of his/her presence and seek to obtain his/her consent.

Sometimes, the environment at the medical facility (such as multi-bad hospital ward, intensive care unit) prevents a physician for talking directly to a patient or conducting his/her examinations in a separated area. In such cases you should try your best to ensure the creation of comfortable environment for a patient (e.g. use of separating screens); at that time you should talk to a patient in a low voice so that your conversation should be heard only by him/her.

### 2.1.7 PATIENT'S PARTICIPATION INTO STUDENTS, RESIDENT PHYSICIANS AND DOCTORS TRAINING AND EDUCATION

Patient's participation in students, resident physicians and doctors trainings and education is a necessary part of medical practice.

Explain a patient why it is necessary to invite students, resident physicians and/or other doctors to attend the physical examination of a patient or provision of a medical procedure (including surgery) or consultations rendered by other. Patient's consent for such cases is mandatory.

Try to create as less discomfort as possible while inviting the above listed persons. After the termination of the procedure thank the patient for his/her good will.

In case a patient is disabled or partially disabled or does not have ability for making informed decision, you should seek written consent from patient's relative or close person.

While teaching (such as classes, workshops, case studies, etc.) you should present documents demonstrating patient's health in a way that does not reveal his/her identity.

### 2.1.8 HOLISTIC APPROACH: BIOPSYCHOSOCIAL MODEL OF PATIENT RELATIONSHIP

While solving a patient's health-related (i.e. biomedical) problems, you should take into consideration the psychological characteristics of a patient as well as the peculiarities of the social environment where patient lives (such as family, work, etc.).

The above noted factor represents a prerequisite for proper compliance with your recommendation and therefore, it is important for effective medical care and patient's satisfaction. Try to get the answers to the following questions:

- ◊ What is patient's attitude towards his/her disease? What does a patient think about his/her health and disease? Is he/she overstressed, anxious or ignorant to his/her problems?

- ◊ How does a patient care about his/her own health? What are his/her expectations from doctor and healthcare system in general?
- ◊ Are your recommendations compatible with:
  - * Patient's behavioral characteristics (organized, disciplined, habits, traditions, etc.);
  - * Micro social environment of the patient (family members, their attitude to a patient, living condition, people living with him/her, who should assist the patient in following doctor's prescriptions and consultations?).
- ◊ Are the preventive, diagnostic, treatment or rehabilitation measures recommended by you available for the patient (from the financial, territorial and technical point of view)?
- ◊ By taking into consideration the answers to the above questions, it would be easier for you to develop recommendations that are acceptable and practical for the patient and ensure his/her involvement into decision making and implementation processes.

**2.1.9 DOCTOR AS A COMMUNICATION EXPERT**

Patient-oriented and effective communication refers to sincere sympathy and support to the patient, open, cordial and polite relationship seeking for his/her favor.

While greeting to a patient or departing from him/her a doctor shall behave as it is usually accepted in the given society. This includes stand up while greeting and leaving the patient.

Give a patient time and opportunity to speak; let him/her fully express his/her thoughts, emotions, anxiety or expectations; Do not ignore patient's emotions.

Talk to a patient clearly and in a way that is understandable for him/her; check how well the patient understands your conversations.

Try to stimulate a patient to change his/her current lifestyle, accurately follow the treatment plan and take care of his/her own health.

Throughout the consultation process, you should not make entries into medical records. Try to make an eye contact (look the patient at his/her face); if required use other method of non-verbal communications (relevant posture, distance between a doctor and a patient, etc). Remember that very often body language has stronger influence over the patient than a word.

**2.1.10 DOCTOR AS PATIENT'S TEACHER**

Patient's education on his/her health-related issues (such as: disease prevention, treatment, rehabilitation) represents an important part of provided medical assistance. Patient's awareness facilitates to establishment of so called "therapeutic alliance" (or cooperation ) between you and a patient. It is a necessary precondition to make a patient involved into disease management instead of making him/her to blindly and indisputably follow doctor's instructions; the above noted serves as a foundation for effective medical care.

Always explain to a patient his/her role in health maintenance and improvement; tell the patient what he/she has to do in order to follow your recommendations. The above mentioned factors are important for the motivation of a patient.

Try to make your recommendations specific, clear and realistic for a patient.

Moreover, while informing a patient on healthy lifestyle, you should take into consideration those rare cases when a patient might consider your consultations as a violation of his/her private life. Sometimes the provision of above information can scare a patient and make him/her believe that he/she is going to develop a certain disease as a result of some ill habits; therefore, the information might become the reason for patient's mental disorder (Iatrogenic Disorder). At that time a healthy person starts to look for the signs of a disease. In such cases, you shall try to persuade a patient that you hide nothing from him/her and that your goal is only to promote healthy lifestyle and protect his/her health.

The same circumstances should be taken into consideration while recommending a patient for cancer screening.

**2.1.11 DOCTOR AND DIFFICULT PATIENT**

Difficulty might be originated from patient's mental disorder, personality or behavior. However, complicated relationship with a patient might be also caused by doctor's inexperience, lack of communication skills or ability to deal with inadequate reactions; also, doctor's overload with work, fatigue and other personal factors as well as shortcomings in healthcare system play major role. System -related shortcomings includes overloading a doctor with work, changes into healthcare financing and insufficient number of visits determined by insurance package or any other reasons. It negatively affects doctor's good image.

Carefully examine a difficult patient on psychopathic diseases. Call for your colleagues'' assistance. Specific communication method and patient's involvement into the process improves the communication.

When dealing with a difficult patient, you should:

- ◊ Ask your colleague for help and discuss the situation jointly; if required, ask for psychotherapist's help;
- ◊ Give such patient more time for the visit than usual;
- ◊ Make a relevant entry into medical documentation describing the components of complication; you should describe your efforts taken to overcome the difficulties and indicate their positive or negative outcomes.

**2.1.12 CONTINUITY OF SERVICE, INVOLVEMENT OF OTHER PERSONNEL INTO PATIENT'S MEDICAL CARE**

Continuity of medical care refers to sustainable provision of necessary preventive, diagnostic, treatment or rehabilitation measures by one or several medical professionals of the same medical facility or by a group of various professionals employed by different organizations.

Try your best to eliminate possible reasons (such as financial, administrative, personal, etc.) causing the unexpected termination of medical care.

If you consider it necessary to involve other medical personnel into the patient's care for ensuring continuous medical service, you should:

a) Explain the patient the need of such action;

b) Give a patient clear information in a way that is understandable for him/her on necessary medical services including the types of examinations, consultations, treatment, preventive and rehabilitation measures, as well as the recommended periods and dates of their application. Ask the patient's close people for help (however, you need patient's prior consent for this), if you think it would help the patient to clearly understand and assess the above mentioned information;

c) You should maintain clear medical records (medical card, consultation form, conclusions, statements, extracts, etc.) in an organized and systematic manner so that they would be easily traceable in case you need to share them with the colleagues;

d) Try to contact a colleague (in case he/she is employed by another organization) who is involved or shall be involved into the provision of medical care to your patient. By all means you should explain in writing the purpose of referring a patient to him/her and the essence of his/her health problem;

e) When you accept a patient referred to you by another physician with a referral documents specifying the purpose of your consultation, you should provide the clear information in accordance with the stated purpose of referral into the consultation card. You should also include other data, which you consider important for patient's health;

f) If colleagues opinions differ from each other while making clinical decisions, you should follow the guidelines specified under section ***2.8.4. Diversity in the Opinions of Colleagues.***

g) If you are unable to provide medical care to a patient and/or ensure its continuity, you shall inform a patient about it and explain to whom and how he/she can address. At the same time, you should ensure that your colleague (the one who would possibly provide medical care to the patient) has access to patient's medical records;

h) It is prohibited to request or receive any payment or benefits from a doctor or a person performing a doctor's duties or from any other medical personnel, whom you intend to involve into the patient's medical care;

**2.1.12.1 Methods of Involvement of other Medical Personnel into Patient's Medical Care**

Methods of involvement of other medical personnel into patient's medical care are as follows:

- ◊ Delegation;
- ◊ Referral;
- ◊ Hand over.

***Delegation*** refers to:

a) An appeal to a colleague to provide a patient with medical service that is defined by you and agreed with you. Liability for the adequacy of such delegation, quality of the medical service and outcome shall be incurred by you. However, the provider of the rendered service (such as manipulation or any other action) shall also bear responsibility for its quality and outcomes;

b) An appeal to a person performing a physician's duties (such as: student or resident physician) to provide the patient with the medical service defined and agreed by you. You should bear responsibility for the adequacy of such delegation, quality o f the service and outcomes.

***Referral*** means directing a patient to another physician and/or medical facility for specific purposes (it happens when you do not possess relevant recourses or the management of patient's disease is beyond your professional competences, etc.) by partially or fully sharing responsibilities on the management of patient's health-related problems.

***Transfer*** refers to fully transferring responsibility on the management of patient's health-related problems to other professional.

In all above defined circumstances, you shall:

- ◊ Provide a colleague or medical facility with full information concerning the patient's health state and medical services rendered to him/her;
- ◊ Make sure that the required medical service is provided within the due time;
- ◊ You must have grounded assumptions that the safety and quality of the medical service will be observed.

**2.1.13 DOCTOR'S REFUSAL TO PROVIDE MEDICAL CARE; TERMINATION OF MEDICAL CARE**

If possible, you should notify a patient (or his/her legal representative or relative) about the refusal to provide medical care or termination of already launched services. You should also specify the reasons of such refusal or termination.

**2.1.13.1Doctor's Refusal to Medical Service Due to the Absence of His/her Professional Competence or Availability of Sufficient Resources**

Prior to providing a medical care to a patient, you should critically evaluate your professional competence and available resources and refuse to provide the service, in the event that:

- ◊ The required medical service is beyond your expertise; or it may fall under your expertise, but you do not have relevant knowledge and skills;
- ◊ You do not have the environment and/or resources required for ensuring the relevant care and quality.

The aforementioned does not cover emergency medical assistance to a patient (see section ***2.3. Emergency Medical Service).***

When declining from the provision of medical care with the reason that you lack professional competences or do not have required conditions and resources, you shall advise the patient where and how he/she can get the required medical service. In addition to this, you shall make patient's health related information available for other medical personnel who will be assisting the patient in a future. Follow the recommendations that are specified under section ***2.1.12. Continuity of Service, Involvement of Other Personnel into Patient's Medical Care.***

**2.1.13.2 Doctor's Refusal to Medical Treatment When it Contradicts With Medical Criteria or Ethics**

You should refuse to carry out medical intervention, if:

- ◊ It is prohibited by law;
- ◊ It contradicts with medical criteria and/or ethical provisions (in spite of the author of such request).

**2.1.13.3 Refusal Due to Doctor's Moral Philosophy**

You are entitled to refuse to medical intervention, which is allowed by the legislation, but contradicts with your moral values.

The aforementioned does not include provision of emergency assistance to a patient (see section ***2.3. Emergency Medical Service)***.

If you decline to carry out certain medical intervention because it contradicts with your moral philosophy, you should notify in advance to the manager of your medical facility and if necessary, insurance company and/or local healthcare management agency as well as your patients.

**2.1.13.4 Refusal Due to Doctor's Safety Concerns**

You are entitled to refuse provision of medical service to a patient or terminate it, if the latter poses real threat to your life (e.g.: fire, electric trauma, blast, etc.)

Herewith, you should try your best to ensure the conditions required for the provision of medical service to a patient; for this purpose you should immediately contact to relevant services (e.g.: fire and rescue service, police, etc). As soon as you have opportunity you should renew medical care of the patient.

**2.1.13.5 Termination of Professional Relationship Due to a Patient's Bad Behavior**

Sometimes patient's behavior (offensive attitude, violence, theft or inadequate action) makes it impossible to continue professional relationship and provision of medical service to such patient.

Before you make a decision to terminate professional relationship with a patient, you should try to restore regular communication with him/her. Ask colleague or the chief for the advices. Also follow the recommendations specified under section ***2.1.11. Doctor and Difficult Patient.***

You should justify your decision on the termination of professional relationship with a patient; notify the patient about it, preferably in writing and indicate reasons for the termination of the relationship.

Inform the patient where he/she can continue medical service and ensure the access to the patient's health related information (first of all, medical records) for those medical professional who will continue patient's treatment. Follow the recommendations specified under section ***2.1.12. Continuity of Service, Involvement of Other Personnel into Patient's Medical Care.***

**2.2. DOCTOR AND VULNERABLE AND UNPROTECTED PART OF SOCIETY**

Unprotected and vulnerable part of society refers to those persons, whose rights are easily violated and therefore, are in need of additional warranties for the protection of their rights.

**2.2.1 MINORS**

In case a patient is minor, decision shall be made by the parent or trustee/legal representative. Accordingly, in order to obtain their consents, you need to act in the same manner as in obtaining consent from the patient (see section ***2.1.4. Informed Consent; Respect for Patient's Decision).*** At the same time, you should try to make a minor (considering his/her age and mental readiness) to participate into decision making and consider his/her thought on medical intervention.

Judging from the above said, the relationship with minors puts additional requirements for a doctor. This is due to the fact, that sometimes it is difficult to maintain good balance among the following three components:

- ◊ Minor's interests and expectations, his/her feelings and emotions;
- ◊ Interests and expectations as well as the feelings and emotions of minor's parents of legal representative;
- ◊ Requirements defined by the doctor and relevant decisions on the provision of medical intervention.

You should bear in mind, that very often what adults consider fair action (i.e. medical intervention), grounded on relevant decision, it might simply be an act of violence for a child if he/she is not properly prepared for it.

In order to overcome the above obstacles, you should create less stressful and worry-free environment for the minor. Show you respect to him/her, listen carefully and with kindness and motivate him/her to ask questions; try to provide detailed answers and make him/her understand that you really care for his/her opinions. You should take into consideration the minor's thoughts while making a decision and persuade him/her that you are following to his/her thoughts, wishes and expectations.

When a patient is a teenager, you should try to spend certain time with him/her separately, without the presence of the parents. It is possible that the teenager may trust you and share his/her private information. At the same time, while making a decision on the basis of the above information, you should also take into consideration the parent's views. If the parent's/legal representative's decision poses threat to the life and/or health of the minor you have a duty to investigate the reasons of his/her refusal of

medical service to a minor (reasons might be: lack of money, religious restrictions, etc.). You should thoroughly explain the parent/legal representative expected outcome of the refusal. Moreover, explain him/her that despite parent's/legal representative's decision, you are authorized by the law to provide help to a child if it is necessary for saving his/her life.

In such a case, if the minor requires emergency assistance you should act in compliance with minor's interest.

If the parents/legal representative oppose your decision you should apply to law enforcement bodies (police) for saving the life of a minor.

If the patient does not require emergency medical care and you have enough time, you should apply to your colleges, ethic committee of your medical facility, administration, human rights organizations, courts and social services. Execution of the court's order is mandatory for both child's parents/legal representative and doctor.

**2.2.2 CONVICTED AND SENTENCED PERSONS**

The sole purpose of your professional relationship (direct or indirect) with convicted and sentenced persons should be the evaluation, protection and improvement of their health.

While providing a medical service to such individuals you should try to ensure, within the scope of the legislation, the protection of their physical and mental health, respect for their dignity and autonomy by the same quality and rules that are applied to individuals who are not convicted or sentenced.

Never use you knowledge and skills for such action, that might have negative outcomes on health of sentenced or convicted person and create any kind of discomfort for him/her. Also, while making a decision you should consider the safety of other individuals may it be convicted or sentenced persons or service personnel.

**2.2.2.1 Convicted or Sentenced Person Who is on Hunger Strike**

Convicted and Sentenced individuals are entitled to announce hunger strike.

In this case you should explain the individual in details the expected results of starvation; make sure that he/she is capable to make informed decisions and assess the outcomes of starvation adequately.

Do not make conclusions on the above mentioned independently. You should ask for a colleague's opinion. If you are assured that a patient adequately evaluates expected outcomes of hunger strike you should provide medical care to him/her only after obtaining his/her consent. Do not try to forcedly feed him/her with artificial food; you should explain such patient that in case of the arrival of unconsciousness, despite his/her declared will, you have the right to apply all the means, including artificial nutrition for saving his/her health and/or life. In making a decision for such cases you should be guided only by medical criteria.

**2.2.3 PREGNANT, LABORING OR BREASTFEEDING WOMEN**

While making a decision on the medical intervention to a pregnant woman you should consider how the intended intervention should affect the fetus.

Accordingly, prior to making a decision on medical service of a pregnant woman you have a duty to provide her, in a way that is understandable for her, full, objective and timely information on possible direct or indirect side affects of the intended care to the fetus. Decision shall be made by a pregnant woman herself.

Ask a woman in labor if she is willing to have a spouse or any other individual next to her during childbirth. If she expresses such wish, let her of this opportunity.

Medical care to a laboring woman shall be provided in accordance with the recommendations specified in section ***2.1.4. Informed Consent; Respect for Patient's Decision.***

A mother shall make a decision on providing medical service required for maintaining health of a fetus.

If a patient requires such medical care that can guarantee the live birth of a fetus and at the time, contains minimal risk for the health and life of the laboring mother, however, she rejects such service, you shall explain her the possible outcomes of declining from this service; you have to underline that in such cases you are authorized by law to provide the service.

Try to keep newborn next to her mother and if mother's and newborn's health state allows, her feed the infant in a way she considers it necessary.

You should explain a mother in details what are the benefits of breastfeeding for a child and for her. Try to assure her in the advantages of breastfeeding, except those rare cases when breastfeeding is not possible or has negative effect on a mother or a newborn.

**2.2.4 DOCTOR AND MENTALLY SICK PATIENTS WITH LIMITED DECISION-MAKING CAPACITY**

If mental health deprives a patient from making an informed decision, you should seek the consent for medical service from legal representative of a patient, or in the absence of such person, from his/her relative.

Prior to obtaining consent, you have a duty to share with patient's legal representative or close person information, specified under section ***2.1.3. Sharing of Information.***

You should remember that you have to inform such patients about their health and required medical care by taking into consideration their understanding skills.

**2.2.5 PATIENT AT END OF LIFE; PALLIATIVE CARE**

A patient in aterminal stage of incurable disease requires special care and attention, which includes effective management of patient's symptoms, moral support of a patient and his/her family members.

A patient should be informed on his/her disease except the rare exceptions (see sub-section ***2.1.3. Sharing of Information)***. Moreover, when sharing information on a lethal disease with a patient you should consider his/her personality and knowledge on his/her disease (what does he/she

know about the disease), as well as his/her readiness to receive or reject the wholesome information; if required and with the patient's consent, you shall involve the family members into this conversation. After sharing the information, tell the patient or make him/her understand that medical service will continue and that you would do your best to help him/her.

There are experience-based recommendations for sharing so called 'bad news' (including diagnosis of a lethal disease) with a patient. Read them and use in relevant circumstances.

Management of patient's symptoms (including the pain) at the terminal stage of incurable disease, as well as his/her care and moral support requires relevant training, experience and skills. If you are missing such experience or skills, you should involve specialists with relevant experience into patient's care (team of palliative care professionals).

Try to involve family members into the care of a patient in terminal stage. According to patient's will, you should support the presence of patient family members next to him/her. Try to help them overcome the psychological barriers preventing them from attending and caring for a dying relative.

In case if a terminally ill patient, declines the medical service that is unable to treat him/her, but will prolong his/her life for a certain period of time, you should find out what a patient really wants. Offer him/her to talk to you in the presence of family members and provide relevant explanations. You should check how the patient's symptoms (pain, vomiting, constipation, hiccough, etc.) are managed; sometimes the reason for patient's refusal to medical treatment may be inadequate management of his/her symptoms.

If a patient has the ability to make decision and his/her symptoms are managed adequately, but he/she still declines the medical care even after the provision of relevant explanations, you should not try to do any medical intervention (including life-prolong treatment) to a patient against his/her will. Herewith, you should explain to the patient's family members that you are not authorized to carry out medical intervention against the will of a patient with sound mental health and decision-making capacity.

**2.2.6 EUTHANASIA; *PHYSICIAN ASSISTED SUICIDE***

You should never participate into euthanasia, which refers to the practice of ending the life of a patient upon his request by means of certain interventions.

You shall never assist a patient in committing a suicide (e.g.: do not give him/her a medicine and teach how to apply it for suicide purposes).

The above action is unethical and prohibited by law; therefore, it shall be prosecuted by the criminal legislation.

**2.3. EMERGENCY MEDICAL CARE**

Outside your work, when a patient requires emergency assistance you should try as much as possible to provide him/her medical care if there is no doctor with relevant expertise present or such doctor is not willing to provide his service. The law makes a physician responsible to provide medical care outside his/her work in every circumstances when a patient requires medical care.

You shall brief another physician who will continue provision of a medical care to a patient about the medical care provided by you (i.e. emergency group physician and/or hospital emergency personnel).

It is prohibited to request any fee for providing emergency medical assistance outside your work.

If the provision of emergency medical care threatens your life you should follow the recommendations specified under section ***2.1.13.4. Refusal Due to Doctor's Safety Concerns.***

**2.4. TRANSPLANTATION OF ORGANS AND TISSUES**

You shall always bear in mind that a donor's decision (such as consent or refusal) to provide organs shall be independent and voluntary. It means that while making a decision, a donor shall be exempt from any types pressure. If a person expresses his/her consent to give his/her body organ for transplanting for the exchange of certain benefits (such as money or financial motivations inspired by the poverty of such person) or for any other reasons (such as psychological pressure, job-related interests, promises to lessen a sentence of a convicted person), such decision shall not be considered independent and the consent - voluntary. Therefore, voluntary consent is a synonym to independent consent. Any consent obtained through the pressure shall be considered illegal.

While participating in the transplantation of human organs, if you suspect that donor's decision on providing an organ is not based on his/her free will, you should not participate in such action.

Trade by organs shall be punishable by law.

**2.5. BRAIN DEATH**

Brain death criteria and diagnosis procedures are defined by the legislation. You should strictly observe the provided legal provisions. Any deviation from them may result in the gravest outcomes for a patient as well as for a doctor.

**2.6. DOCTOR'S ACTIONS IN CASE OF SCARcE RESOURCES**

In the event of scarce resources, you shall:

a) Provide the patient with detailed information including the following:

- ◊ Type of the service patient requires and the reason for not providing the best care;
- ◊ Type of care your facility or other facilities known to you can offer to its patients;
- ◊ Inform the patient about possibilities of obtaining funding for required medical care from governmental, private and non-governmental agencies;
- ◊ Inform the patient on the ways of obtaining additional information on the above issues;

b) You shall ensure the best use of the information and resources available to you for the well-being of a patient;

c) Follow the recommendations specified under the section ***2.9.2. Ensure the Availability of the Service.***

**2.7. DOCTOR AND PATIENT'S FAMILY MEMBERS AND CLOSE PERSONS**

You should establish a good relationship with a patient's family members and close persons. You have to be kind to them, show your support and sympathy.

In case a mentally capable patient permits you, you can find some time to discuss patient's disease, treatment and prognosis with patient's family members and close people. You should underline their role and importance in patient's care and treatment; try to involve them as much as possible and make them participate in patient's care in order to ensure moral and psychological support to the patient. Make sure that family members and close people understand that except the patient you also need their assistance and support. Try to seek their positive attitude.

If you provide the above information to a patient's family member or a close people with a consent of mentally sound patient, you shall make detailed entry about it into the medical records. You should do the same in the event the patient is disabled to such consent.

You should understand what are patient's family members expecting from you; try to make their expectations realistic and include all difficulties and unexpected circumstances that are accompanying to medical care. Be open and never hide the truth from them in spite of the bad news (of course, you need to have a consent for this from a mentally capable and informed patient, who is able to make such decision). Bear in mind that their positive attitude to you might last as long as the medical care is effective, or unless the patient's condition worsens. Family members and relatives of a patient may dramatically change their positive attitude if their expectations are not met or due to some objective circumstances (such as: difficult or incurable disease, late treatment, etc.), or if medical service turns out to be ineffective, or patient's conditions worsen or he/she dies. They might even become aggressive towards you notwithstanding the reasons that led to such results (it can be doctor's mistake or other objective factors).

**2.7.1 PATIENT'S FAMILY MEMBERS IN MEDICAL FACILITY**

Very often when a patient undergoes medical care at a medical facility (hospital, in-patient clinic) he/she desires to be attended by his/her family member (or members) or other people who are close to him/her. Sometimes, a patient is not capable to express his/her wish (such as infants, mentally diseased persons or unconscious patients). In such cases a patient's family members or close people express their wish to be next to him/her.

There are some evidences that state the following:

a) Closeness to family members help a patient to feel more comfortable;

b) Attendance of close people makes family members less doubtful in the quality of rendered medical service; family members are less concerned and worried about their close person's health state; in addition, a patient's family members are happy to be present and to help the patient; in case of the death of the patient, family members' stress and anxiety is considerably relieved;

g) Presence of family members does not hinder the medical service or aggravate the outcomes of the care. It has no negative affects over the mental state of family members.

You shall try to support the presence of family members to a patient with the exception of those rare cases when the presence of family members may hinder the adequate medical assistance, or create a discomfort for other patients.

You shall cooperate with other personnel of the facility and representatives of administration with the purposes to laying down the clear rules about the presence of patient family members in the medical facility. You should provide patient family members and relatives with the information on such rules.

**2.7.2 RELATIONSHIPS WITH FAMILY MEMBERS IN CASE OF PATIENT'S DEATH**

After the death of a patient you should be attentive to his/her relatives. Family members, who witnessed the death of a patient, are often required to be provided with psychological assistance. Express sympathy for them, explain the cause of death to the utmost details, make them understand that you are really very sorry. You should remember that after the shock caused by the death of a close relative, sometimes there is a search for "guilty person." Family members often blame themselves and/or healthcare professionals or the entire system even if it was quite impossible to prevent the lethal outcome. You should explain to them that nobody is "guilty" and that it was impossible to avoid the death.

There are the experience-based recommendations on the relationships with family members and relatives of the deceased patient. You should get familiar with them and use them as required.

**2.8. DOCTOR AND COLLEAGUES**

Establishment of the atmosphere of mutual respect between the colleagues increases the prestige of doctor's activities to a greater extent.

**2.8.1 COLLEAGUE'S PATIENT**

If you are applied by a patient supervised by some other doctor in the past for the same problem, you should do your best for the aforementioned doctor to be informed on the fact by the patient himself/herself or his/her relatives. In case you deem it necessary to change the previous decision made the other doctor regarding diagnosis, treatment, or medical intervention, try to provide the patient with this information in such a form, that he has no feeling of distrust towards the doctor supervising him/her in the past. If the change you intend to make regarding the diagnosis or treatment is very essential, try to contact the above mentioned doctor based on the patient's consent and tell him about your decision and discuss both, old and new decisions. All this is necessary in case the doctors are

employed in one and the same facility, but it would be desirable if they were employed by different organizations.
You should never refuse to render a medical assistance to a patient because he\she was treated by some other doctor in the past.
You should never try to "win over" your colleague's patient. Boasting is as unacceptable as defaming of another doctor.
If a colleague, employed in your facility is unable to render a medical assistance to a patient due to some reasons, you should try to do your best to protect the patient's interests; you shall act as an alternative to your colleague, or inform other colleagues to ensure the continuous medical care necessary for the patient.

**2.8.2 COUNCIL OF DOCTORS**

Don't make the patient, his/her relative or legal representative attend the council of doctors. You shall obtain the patient's consent in advance regarding the person to whom the information on the council's decision has to be provided. It may be the patient himself/herself, his/her relative or legal representative. Choose one of the colleagues attending the council of doctors for disclosing the information about the decision.
If there is a variety of opposing opinions on the council of doctors, try to reach a consensus or identify what is to be done for the formation of the collective opinion.
After the end of the council of doctors, you should provide a patient (or his/her close person or legal representative) with fair information on diversity of opinions, explain the objective reasons for the unavailability of mutual opinion in detail; you should clarify the ways determined for arriving to the final decision. If there are several possible ways of controlling a situation, you should give information to the patient (or his/her relative or legal representative) about the alternatives in the form of a collective opinion of the council participants. Inform him/her about the council participants' collective recommendation on these alternatives. In this case the final decision is made by the patient (or his/her relative or legal representative). You should avoid telling the names of the authors of the particular opinion, unless it is categorically demanded by the patient or the author of this opinion.
Make a complete entry of opposing as well as agreed opinions of council participants in the minutes of the council of doctors.

**2.8.3 INVITATION OF A COLLEAGUE**

You should realize the scope of your capabilities/ competencies within your specialty. Never be ashamed of acknowledging the fact that you have insufficient knowledge and/or skills in some spheres of the specialty. In such a case you should invite your colleague, who will render a better assistance to the patient; herewith try to accomplish the lack of your professionalism through participation in the system of continuous professional development.

**2.8.4 DIVERSITY IN THE OPINIONS OF COLLEAGUES**

When the opinions of the doctors involved in rendering a medical assistance to the patient differ you should:
a) Listen to arguments of all parties and for the beginning prove your opinion without participation of a patient;
b) Try to reach consensus prior to giving the information to the patient about the final decision;
c) Upon making a decision the health interests of a patient are superior.
d) In case of failing to reach a consensus provide the patient with complete information on existing alternative opinions.
e) Decision is made by the patient, but in case of patient's disability or absence of a conscious decision, it is made by his/her legal representative, or family member.

**2.8.5 ASSESSMENT OF COLLEAGUE'S ACTIVITIES**

You should be honest and objective in oral or written assessments of your colleague's activities. While assessing other physician's activities and especially his/her mistakes, your views should be backed only by facts and categorically not by the hypotheses or assumptions.
You should always take into consideration the environment in which the doctor has been acting, take into account the objective factors possibly causing the physician's mistake.
Discussions on colleague's incompetence or mistake are allowed only within the circle of professionals. The aim of discussions should be the stimulation of improvement of colleague's professional level as well as the quality of his medical assistance. Discrediting the colleague's activities in any other circumstances sours the atmosphere of a mutual respect among the colleagues and negatively affects the prestige of doctor's activities in the society.

**2.8.6 CONCERN FOR COLLEAGUE'S PROFESSIONAL COMPETENCE**

If you notice the lack of knowledge and professional skills of your colleague, you should tell him/her about it confidentially and fairly and help to improve as much as you can.

**2.8.7 CONCERN FOR COLLEAGUE'S HEALTH**

If a colleague applies to you due to his/her state of health, you should try to do your best for resolving the financial and organizational problems related to the required assistance.

**2.9. DOCTOR AND SOCIETY**

**2.9.1 SUPPORT TO IMPLEMENTATION OF HEALTHY LIFE-STYLE IN THE SOCIETY**

You should try your best for the implementation of healthy life-style among your patients and in the population in general, for taking preventive measures, raising the education level of the population in the sphere of healthcare related issues.
At the same time you have to set an example of a healthy life-style by yourself. It especially concerns smoking, alcohol abuse, etc.

**2.9.2 ENSURE THE AVAILABILITY OF SERVICE**

You should take as much care as you are able to ensure that:

- ◊ Payer (state, insurance company) adequately covers medical service expenses;
- ◊ The list of services offered to the patient by the payer (state, insurance company) is as complete as possible.

**2.9.3 STRENGTHENING THE TRUST IN THE PROFESSION OF A DOCTOR**

In the medical profession prerequisite for trust is the compliance of doctor's activities with professional and ethical standards recognized in the country. It implies:

- ◊ Recognition of supremacy of patient's interests;
- ◊ Objective assessment of colleague's as well as your own abilities;
- ◊ Continuous perfection of knowledge and skills;
- ◊ The best quality assurance of services rendered in cooperation with other colleagues.

You should try to support the establishment of realistic attitude of population towards the capabilities of medicine. Do not contribute to the implementation of unrealized expectations in the society. It involves technological (diagnostic, medical, etc.) innovations as well as the capabilities of the entire healthcare system. Definition and proper grounding of system priorities in cooperation with the society, promotes the trust in the doctor's profession.

**2.10. DOCTOR AND MASS MEDIA**

Cooperation with mass media enables the doctor to draw the society's attention to population's health issues and the most essential aspects of the healthcare promotion, including:

- ◊ Healthy life style and disease prevention;
- ◊ Role of a patient in management of various health-related problems;
- ◊ Problem of availability of medical services.

You should try to cooperate with mass media on the above mentioned issues.

Do not use mass media for displaying your privilege through comparing it with the activities of other physicians or medical facilities.

While providing the information to mass media avoid indicating the personality of a specific patient, do not disclose the patient's confidential information unless you are given the consent of a patient and/or his/her legal representative (section ***2.1.5 Information Confidentiality).***

You should not permit to film a video or take a photo of a patient unless you are given the consent of a patient and/or his/her legal representative.

**2.11. SELF CARE OF A DOCTOR; TREATMENT OF IMMEDIATE FAMILY MEMBERS BY DOCTOR**

You should not undertake a self-treatment, treatment of your immediate family members and close people. Remember that in such cases there is a strong probability that your decision is not objective and the quality of your assistance is not adequate.

Exception to this rule is allowed only in case of urgent medical care and/or unavailability of other physician.

**2.12. DOCTOR AND INDUSTRY**

In the present document the term "industry" implies a business (commercial, profit oriented) legal entity, whose goods/products are used in healthcare field, such as:

- ◊ Pharmaceutical industry;
- ◊ Biotechnological industry;
- ◊ Infants artificial food producing industry;
- ◊ Parenteral food producing industry;
- ◊ Medical tools producing industry.

Cooperation between the healthcare field and industry is beneficial for patient, for doctor and for the society as a whole. But sometimes industry goals not always coincide with the priorities of the healthcare system and the methods of "charming the doctors" do not coincide with the principles of medical ethic.

While dealing with industry you should attentively define what the industry representative is asking from you in exchange for the rendered service (sponsorship). Only after that you should take the decision on using the aid.

It is desirable to choose a special person from your medical facility for relationship with industry. This person will be responsible for the adequacy of these relations. This function can be assumed by the Ethic Committee, which will elaborate relevant recommendations. The above-mentioned recommendations and the basis for their elaboration should be known to the medical facility personnel.

**In case of a private/individual practice** following recommendations should be taken into consideration while dealing with industry:

- ◊ Do not accept reimbursement or present from the industry representative under the condition that you will facilitate the distribution of their production, be it in the form of a product (medicine, medical facility, artificial food, etc), or sponsorship (any of its form);
- ◊ Doctors are not allowed to participate in the distribution of industry's products (medicine, medical facility, artificial food, etc), flyers or ads;
- ◊ While selecting a medicine, or making a prescription for patient, doctor should be guided solely by the interests of the patient; you should never write a prescription on the form bearing the emblem of the pharmaceutical company;
- ◊ You should attentively consider the offer of the industry to sponsor your attendance at scientific conferences, various meetings, or your participation in educational events (travel and accommodation expenses, reimbursement of participation fees etc);
- ◊ Compensation accepted for services rendered to the industry should be very transparent; you should inform the employer about it and if necessary inform the patient too;
- ◊ If you are in associated with a pharmaceutical company and are participating in the preparation of the National

Recommendations for the Clinical Practice (Guidelines), you should inform about it to your collogues involved in the elaboration of the mentioned recommendation.

**2.13. DOCTOR AND INSURANCE SYSTEM**

You should well ascertain the existing healthcare system and insurance conditions. Provide the patient with wholesome information about the services he can receive due to the insurance policy and what exceptions are allowed according to the insurance contract.

You should always try to make a rational use of the sums extended by the insurance companies for the medical service. At the same time try not to allow the insurance system to act in harm of professional or ethic standards existing in medicine and against the health interests of a patient.

**2.14. GIFT TO A DOCTOR**

Unselfishness and fair treatment is a key factor for a good attitude of the patient towards the doctor. You should never act according to the principle of making a profit out of your professional activities.

Giving presents to a doctor is a tradition which is always associated with medicine. In some cases a present is an expression of a sincere gratitude (to pay kindness for kindness) and in other cases it's a charity. Sometimes it is conditioned by the desire to have an influence on the doctor (gaining certain privileges). Sometimes it can be difficult for a doctor to define the motivation of a patient while giving a present, is it altruism and sincere gratitude, or some pragmatic considerations. All this can be revealed during the further stages of doctor-patient relationship.

The main thing is that the present mustn't have the influence on your disposition towards the patient as well as on the quality of the rendered medical service. You shall bear in mind, it is not acceptable to take a present in case it is aimed at receiving a certain priority during rendering a medical service.

**2.15. SELF-ADVERTISEMENT OF A DOCTOR**

Do not try to speak about your priorities in expense to the decay of the activities of your colleages or other medical establishments.

At the same time you can provide the society with clear information about the medical aid offered by you in diversified forms. It may include the detailed list of services, used methods, various materials reflecting your qualifications (State Certificates in some specialty or subspecialty, facts proving the experience).

**2.16. DOCTOR-EMPLOYER RELATIONSHIP; LABOR AGREEMENT**

You should attentively read labor agreement to be signed with the employer. Agreement should reflect the obligations of parties including the description of the work to be fulfilled by the employee, the terms of Agreement showing the exact dates of the beginning and the expiration of the Agreement. You should pay attention that a relevant reimbursement and the necessity of adequate work environment are reflected into it. Agreement may also include some additional conditions, different from those defined by the legislation. But additional conditions shouldn't limit, or worsen the requirements set forth by the legislation. Namely, if the terms and conditions of the work Agreement are worsening the condition of the employee as compared to those given in the norms of the Labor Code, such norms are considered to be void.

Employer is obliged to fulfill the obligations set by the legislation as well as the conditions which have been additionally included in the Agreement. At the same time Employer has a right to establish additional social and labor benefits apart from those defined by the legislation.

**2.17. QUALITY OF THE MEDICAL SERVICE AND PATIENT'S SECURITY**

Quality of the medical service and patient's security are the top priorities for the doctor. You should make permanent efforts to improve your knowledge and skills in order to promote the security. At the same time you shall bear in mind that quality of the medical service and security doesn't solely depend on your knowledge, experience and skills. There are numerous factors defining the outcomes of the medical service and satisfaction of a patient, in particular: professional skills of other medical personnel, adequacy of the reimbursement, work environment, medical facility routines, equipment, established standards of medical service, existence of a formal system of promotion of the medical service and patient's security within the facility, peculiarities of the relationships between the management of the facility and medical personnel, environment regulating the doctors' activity in the country, etc.

**2.17.1 Participation in the Promotion of the Quality of Medical Care and Security of Patients**

Make your best efforts to create a system of promotion of the quality of the medical service and security of patients. Take an active part in functioning of this system. If possible try to facilitate the inclusion of your colleges in this process. It includes the following:

- ◊ Organizing the internal councils and participation in them;
- ◊ Carrying out of the clinical-pathological conferences and participation in them;
- ◊ Participation in the adaptation and implementation of the guidelines of the clinical practice and protocols in everyday life;
- ◊ Implementation and participation in the internal and external audit systems;
- ◊ Involvement into the continuous professional development system;
- ◊ Review of mistakes made by the doctors during their professional activities, the aim of which is to analyze mistakes and prevent their occurrence;
- ◊ Constructive and favorable criticism of colleagues' activities, your constructive reaction on their feedbacks;

- ◊ Participation in the review of the deceased patients' medical documentation;
- ◊ Participation in the elaboration and review of the regulatory acts of the doctors' activities and the healthcare system; efforts to improve the revealed weaknesses of existing regulatory acts by means of inclusion of state bodies, professional associations and patients organizations.

### 2.17.2 Working Environment

Adequate working environment, work regime and adequate reimbursement are the doctors' rights stipulated by the legislation. The employer/management of the company is responsible to promote the improvement of all the above rights. Do not hesitate to remind them about it if needed.

The above said fully concerns the deficit of resources in the company, which may hinder the creation of a secure environment for the patient as well as promotion of high quality medical service.

Provide employer/management of the company with relevant information in writing. If required, engage public authorities, professional associations, organizations defending the patients' rights. Remember, you may be imposed responsibilities for all the above mentioned circumstances and for causing damage to the patient.

### 2.18. MEDICAL DOCUMENTATION

Draw up the medical documentation of a patient attentively. Be sure to include the patient's identification data as well as the wholesome information about diagnosis, dynamics and the results of treatment of a disease. In the records reflecting the type of intervention (diagnostic, treatment, etc.) you should adequately describe the basis for such decision. You should also present the information which was provided to the patient (his representative/ relative) regarding the intervention. Their consent or refusal should also be reflected distinctly. In some cases defined by the legislation, the patient or his authorized representative should confirm their consent by signing the document. (See section ***2.1.4. Informed Consent; Respect for Patient's Decision)***.

If there is any doubt regarding the diagnosis and the treatment, you should clearly state the cause for this doubt in the documentation. You should also describe the measures, necessary for dissipation or confirmation of such doubts.

If it is impossible to fulfill your recommendation due to some objective circumstances, point out the relevant causes, possible impact on the dynamics and outcome of a disease in the documentation. Describe the measures applied for the fulfillment of the recommendation. If needed contact the ethics committee and the management of your organization.

Information, reflected in the medical documentation, is confidential and its disclosure is allowed solely in the cases determined by the legislation.

If there are any mistakes in medical documentation, correct them. Do not erase the old notes and records in case you change the false information or add some details. Emphasize the reason for mistake (example: late provision of information by patient or his relative/authorized representative, or delayed results of a diagnostic research, etc.) and then add the new information.

Remember, medical statements can be used for the analysis of the quality of medical service (e.g.: audit system) for the purposes of its improvement, teaching or scientific research. Consider that medical records can also be used as a proof by the law enforcement bodies and by the court. It is quite natural that law enforcement bodies refer only to the facts given in the documentation. So, in the medical documentation you should describe any facts connected with the patient or his relative/authorized representative in detail. You should also include their psychological parameters, peculiarities of relationships between them, hindering the adequate medical treatment. Pay attention to other influencing circumstances (e.g.: impossibility to use certain types of diagnostic or treatment method) that posed the obstacle to adequate fulfillment of medical service as well as to the measures, which were applied by you for the eradication of the drawbacks.

Patient's medical certificate should be issued solely in the official language.

### 2.19. DOCTORS BEHAVIOR IN THE EVENT OF UNSUCCESSFUL MEDICAL SERVICE

In the event of unsuccessful medical service, explain the reason to the patient (relative/authorized representative) in detail. Before giving the explanation think over the sequence of your arguments, prepare yourself to answer the questions, envisage the expected reactions of listener, if possible. Conduct the conversation in a quiet and comfortable environment, ensure the person that you have a feeling of a sincere sympathy.

After the unsuccessful medical service it is absolutely necessary for you to evaluate your professional activity. Seek your own weak points possibly leading to failure. Try to eradicate the gaps.

### 2.20. DOCTOR'S BEHAVIOR IN THE EVENT OF THE MEDICAL ERROR

Profession of a doctor is the most difficult and the most risk bearing profession. You are never insured against a professional mistake. Such mistake can be caused by the factors totally independent from you, such as: insufficiency of equipment/ resources, medicines or additional facilities, poor work environment. Also the reason for that can be the insufficiency of your own knowledge or skills.

If the medical mistake is discussed within the circle of your colleages, try to define the reasons of your mistake together with them. At the same time set the ways of avoiding similar mistakes in the future. Listen and analyze your colleagues' remarks attentively. Always remember that a sincere confession, judgment and evaluation of your own mistakes in front of your colleagues points to the high level of your professionalism.

While evaluating others' mistakes always remember that the medical mistake means that in a given situation it became impossible for a specific doctor to forecast and avoid the results of his/her action or inactivity. Define the possible causes of the mistake with a good-will and impartially. Besides the subjective factors (doctor's knowledge, experience, and skills) you should also analyze the environment in which the doctor carried out his activities. Assess, whether it was possible to arrive to a right conclusion in such an environment.

**2.21. PLAINTIFF PATIENT**

Medical service, even if it is absolutely adequate, cannot be always effective and it can easily become the motive for complain. In such a case (if the doctor's mistake is excluded) explain to the patient that the reason for ineffectiveness is the non-improvement of medicine and not your own weakness. Other than the above-mentioned, the cause of such ineffectiveness can be the personal characteristics of a patient (see sub-section ***2.1.11. Doctor and Difficult Patient***) or the non-improvement of organization of service [patient had to wait for a long time, other staff member (some specialist, doctor's assistant, cleaner, etc.) was not correct to him/her] or something else.

In frequent cases patient's complains represent important means of determining shortcomings of the service. Therefore, you shall listen to the complaining patient attentively and without interruption; let him/her speak what he/she thinks, let him/her fully express the reason for his/her dissatisfaction. Try to acknowledge everything. Do not avoid excuses. It doesn't necessarily mean that you confess your mistake or your blame; it is the best way of expressing understanding and tolerance. If the patient's dissatisfaction is caused by the organizational problems of service, thank him/her for letting you know about it. Assure the patient that you seriously acknowledge the problem he/she had revealed. Promise that such thing will never happen with his/her regard or with regards to any other patient. Explain what measures will be taken to eradicate this problem. At the same time, be frank and never promise the things you will never be able to do.

Patient's complain must not have any influence on the availability of the medical service for him/her as well as the quality of the rendered medical service.

**2.22. DOCTOR AND LAW ENFORCEMENT BODIES AND OTHER STATE INSTITUTIONS**

You should be objective and impartial when law enforcement bodies or other state institutions carry out forensic examinations. You should necessarily take into consideration the environment in which the doctor had to make a decision, psychological characteristics of patient and/or his/her relatives/legal representatives, social and cultural peculiarities; think if it was possible to establish a therapeutic alliance between the doctor and the patient (or his/her relative/legal representative), or was the time period long enough to establish such alliance. While drawing the conclusion, average statistic indicators and considerations based on literary data shouldn't become your orientation criteria. While matching the doctor's activities with the recommendations envisaged by the clinical practice guidelines and the protocols, you should always consider the possibilities of their realization in a specific environment and with a specific patient. Also consider the recommendations reflected in section ***2.20. Doctor's Behavior in the Event of Medical Mistake.***

**2.23. TAKING CARE OF DOCTOR'S PROFESSIONAL COMPETENCE; CONTINUED PROFESSIONAL DEVELOPMENT**

For providing the adequate and professional service, which answers the demands of ethic standards, it is necessary to update and increase your knowledge and skills permanently. This process should start from the very beginning of your professional practice and should last till the end of your medical activities. Never think that your knowledge is perfect. Your personal experience and knowledge are really very important, but at a certain stage (new medicines, new technologies, new methods of treatment, etc.) they may appear insufficient for the promotion of medical service, relevant to the achievements of modern medicine.

**2.24. DOCTOR AND MODERN TECHNOLOGIES**

While using the new technologies "Festina Lente". Make sure that there is a proof of such technologies being useful; judge what difficulties you will be encountered during the implementation of new technologies due to existing traditions and approaches. Take a course of relevant training before using the technology. Inform the patient about your experience in this regard and only after that accept the patient's informed consent on the procedure.

Before using a new medicine, seek for the proof of its effectiveness.

Make sure that the medicine is registered in the country (is allowed to Georgian market) and only after that prescribe it to the patient.

At the same time you can recommend the patient to use any medicine not registered in Georgia if it is necessary for the patient's health. In such a case inform the patient that legislation allows the import of medicines for separate patients for the non-commercial purposes without considering "the regime of permission to enter the Georgian market".

**2.25. DOCTOR AND TELEMEDICINE**

While giving the recommendations to the patient based on the consultation received via telemedicine, you will be bearing the responsibility for their results.

According to the patient's request, his health and private life data can be voiced without mentioning the patient's name.

[3]Georgian Law on Medicines and Parmaceutical Activities, Article 11.13.

**2.26. DOCTOR AS A RESEARCHER**

Biomedical research is necessary for the development of medicine as well as for the elaboration of effective preventive, diagnostic, treatment and rehabilitation methods.

Assist researchers who are carrying out the research in your institution and offering you cooperation. At the same time always consider the necessity of ensuring the security as well as the rights of research subjects. Patient's security and health are superior to the goals of research.

You should agree on your participation or your patient's inclusion in the research only in case the research is approved by the relevant ethics committee. In order to find it out, ask the lead researcher to present the conclusion of the ethics committee.

Prior to patient's inclusion into such research:

- ◊ Read the research plan and the form of informed consent carefully;
- ◊ Thoroughly read goals and methods of research and the ways of selection of research subjects. Find out what will be the benefits of research outcomes in general; how your patient or other patients, being in the same situation as yours, can benefit from this research. Find out what are the risks associated with this research. What will be the possible discomfort for the patient/ research subject during the participation in the research.
- ◊ In case you are the person who is responsible for receiving the patient's consent for participation in the research, you should:
- ◊ Advice the patient about the purpose of the research, explain what will be the benefits for this particular patient and for other patients being in the same condition. Make sure that his expectation is not exaggerated and unmotivated with regards to the usefulness of participation into the research;
- ◊ Inform the patient about the risk and discomfort associated with his participation into the research;
- ◊ Introduce Informed Consent Form to the patient including the detailed information about the research and give him/her the time and the possibility to get familiar with the mentioned form;
- ◊ Ask the patient to put you the questions regarding the issues which are interesting to him/her after he/she gets acquainted with the information reflected in the Informed Consent Form. Try to answer his/her questions in simple words, which will be easily understandable for the patient. Make sure that the patient received the answers to all questions of his interest;
- ◊ Explain him/her clearly that it is his/her right to refuse to participate in the study and if he/she agrees to participate, he/she will be allowed to discontinue his/her participation at any stage.
- ◊ You have to explain to the patient clearly that his/her joining or exclusion from the research will by no means influence over the provision of his/her medical service.
- ◊ You should give time to the patient to take a decision about his/her participation into the research.
- ◊ You should apply your signature and ask the patient to apply his/her own signature on the Informed Consent Form only after you make sure that patient acknowledged all the information related to the research and his/her agreement is free from any pressure.
- ◊ During the course of research:
- ◊ Pay special attention to the fact that applied research methods fully comply with the methodology reflected in the research plan.
- ◊ Promote the confidentiality of the patient's existing data in accordance with the methodology reflected in the research plan.
- ◊ Evaluate the patient's health condition considering the risks and discomfort associated with the participation into the research. Remember that as we have already mentioned it before, the patient's security and health always prevail upon the research goal, no matter how important the latest is.
- ◊ In the event of any un-envisaged situation arising in the process of research, inform the chief researcher, responsible for informing the relevant ethic committee as well as the structures and individuals envisaged under the legislation and the research plan.
- ◊ Observe objectivity and record the received data accurately and precisely, no matter they are desirable or not desirable for the group of researchers or sponsors.

**2.27. DOCTOR AS A TEACHER**

Educational activity assists the professional development of a doctor. In case you are given a possibility to participate in education or training of students, resident physicians or doctors never decline it. For the effectiveness of your efforts get familiar with the methodology of teaching the adults and learn more about their skills.

**3. IMPLEMENTATION OF THE CODE OF DOCTOR'S PROFESSIONAL CONDUCT**

Adherence to the recommendations set forth in the the Code of the Doctor's Professional Conduct is optional.

At the same time, considering the fact that the Code of the Doctor's Professional Conduct is based on the acting legislation and recognized ethics standards, usage of these rules will help the doctor to conduct a secure medical practice corresponding to the modern ethical standards. Observance of the code of conduct will enable the doctor at least to avoid the conflict with the legislation and on the other hand improve the quality of the medical services provided by him and increase patient satisfaction.

The main way of implementing the Code of the Doctor's Professional Conduct is the official recognition of this code by the doctors' professional associations. By recognition of these rules, association calls its own members to be guided by the Code of the Doctor's Professional Conduct.

In the process of evaluating the quality of the medical service rendered by the doctor and defining the need of the continuous medical education, tasks, goals etc., doctors associations and various institutions created by these associations can be guided by the Code of the Doctor's Professional Conduct.

### 3.1. RECOGNITION OF THE CODE OF THE DOCTOR'S PROFESSIONAL CONDUCT BY PROFESSIONAL ASSOCIATIONS

The Code of the Doctor's Professional Conduct is attached by the Appendix – Declaration on Recognition of the Code of the Doctor's Professional Conduct. By signing the mentioned declaration doctors' professional associations confirm the recognition of these rules.

Declaration on Recognition of the Code of the Doctor's Professional Conduct is kept in the Georgian Medical Association.

There is a following procedure regarding the recognition of the Declaration on Recognition of the Code of the Doctor's Professional Conduct by the doctors' professional associations:

- The Head of the professional association willing to recognize the Code of the Doctor's Professional Conduct presents a relevant application to the Georgian Medical Association. This application is attached by the document reflecting the decision of the governing body of the professional association (certified statement from the minutes of the meeting, stating that the meeting took a decision that the professional association recognizes the Code of the Doctor's Professional Conduct).
- Following to presenting the application, the head of the professional association signs the "Declaration on recognition of the Code of the Doctor's Professional Conduct, by which he confirms the recognition of the Code of the Doctor's Professional Conduct. Signature should be verified by the stamp of the professional association.
- Any doctors' professional association registered in Georgia is allowed to recognize the Code of the Doctor's Professional Conduct at any time.
- The doctors' professional association, which is joined to these rules, will be allowed to cancel its signature at any time. For this purpose a relevant application should be submitted to the Georgian Medical Association.
- Georgian Medical Association permanently revises the list of professional associations, which recognized the Code of the Doctor's Professional Conduct and keeps the applications and attached documentations of the professional associations.

# Breast Cancer Burden in Tbilisi

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**Summary**
According to GLOBOCAN/IARC (2013), in 2008, 1,384,000 new cases of breast cancer incidence and 458,000 cancer related deaths were registered worldwide. An epidemiological research has been conducted in the University of Georgia to specify the number of breast cancer incidence in Tbilisi. There has been data on 12,913 cases of breast cancer in Tbilisi in 1998-2010 provided by the National Center for Disease Control and Public Health (NCDC). Tbilisi Population Cancer Registry provided information about 16,705 cases of death in Tbilisi female population in 2002-2004. Based on the descriptive analysis, it has been determined that in Tbilisi female population, the number and frequency of breast cancer is an important medical and social problem. The frequency of incidence of breast cancer in Tbilisi (ASR=123%000; AAR=158%000) and the frequency of cancer related deaths (ASR=33%000; AAR=43%000) correspond to the index of the average level of the developed countries of the world. Besides, according to both indicators in dynamics, there was an increase in breast cancer incidence. Compared to 1988-1992, in 2008-2010, according to SRR, the frequency of breast cancer rose by 3.5 times, and according to SIR – by 253%. In Tbilisi, in 2002-2004, the cases of deaths caused by cancer ranked second after circulatory system and its share in the structure of death comprised 18%. In the structure of cancer mortality in women over 25, breast cancer ranks first. At the same time, at a later period, 35-59, breast cancer again ranks first in the structure of different causes of death. As a result of the research, recommendations have been worked out.

***Abbreviations:*** *ASR- Age Standardized Rate, TASR- Truncated Age-Standardized Rates, SRR- Standardized Rate Ratio, SIR- Standardized Incidence Ratio, AAR- Age-Adjusted Rates, CR-Cumulative Risk.*
***Key words****: breast cancer, incidence, mortality, disease burden, epidemiological study, descriptive indicators, Tbilisi.*

**Problems Statement:**

In the modern world, for a few decades the burden of diseases has been mainly defined by chronic diseases. Among these diseases, alongside circulatory ones, cancer is the leader. It is generally accepted that the issue of breast cancer has long gone beyond the sphere of medical care and has acquired the meaning and importance of vital social problems.

According to GLOBOCAN/IARC (2013), in 2008 there were 1 384 000 new cases of breast cancer which caused 458 000 deaths.

According to Parkin D. M. and Fernandez L. M. G. (2006), approximately 16% of world population is covered by Cancer Incidence Registry System while receiving information about cancer mortality can be found in approximately 29%.

According to Parkin D. M. and Fernandez L. M. G. (2006), the index of breast cancer incidence and mortality considerably differ in different regions of the world. Mainly, the highest level (80 and more per 100 000 women) is found in the developed regions, while low level (30 and less cases per 100 000 women) is found in the developing regions. At the same time, there is a tendency of increase in breast cancer incidence in almost all regions.

According to the data provided by World Health Organization (WHO, 2005), the highest index of breast cancer mortality was registered in Denmark (23,5%000), Belgium (22,6%000), Ireland (22,2%000) and Holland (21,7%000), while the lowest index was registered in Tajikistan (4,8%000), San Marino (6,0%000), Albania (7,4%000), Turkmenistan (7,9%000), Uzbekistan (8,5%000) and Kyrgyzstan (9,9%000).

According to the data provided by World Health Organization (WHO, 2008), breast ranks first in the structure of cancer in developed regions, America, Europe and West Mediterranean regions, and it is the second in Africa and South-Eastern Asia.

P. Boyle and J. Ferlay (2010) analyzed breast cancer incidence and mortality in 25 European countries in 2004. Breast cancer is one of the main forms of cancer for European women. In 2004, 370 100 new cases of breast cancer incidence (27.4% out of all types of cancer in females) and 129 900 cases of mortality (17.4%) were registered in Europe.

According to the data provided by Fred Hutchinson's Cancer Research Center of Washington University (Porter P.L., 2009), there has recently been a tendency for increase in the number of breast cancer incidence and mortality in the whole world, particularly in economically less developed countries. On the one hand, it is connected with the changes in the distribution of the risk factors such as a different way of life, genetic and biological differences between ethnic groups and races. On the other hand, in economically less developed countries, there are no commonly established effective strategic programs to control cancer, like cancer screening, which is able to considerably reduce the number of deaths caused by breast cancer.

Breast cancer incidence is higher in economically developed countries among white population. According to database by Global Cancer (GLOBOCAN/IARC), by 2002, worldwide, 37.4 per 100 000 women, suffered from cancer and 13.2 died of it. Among them, 103.7 suffered and 18.1 died in economically developed countries, while in developing countries, 20.9 suffered from and 10.3 died of cancer. It is notable that the incidence/mortality ratio is on average 0.35. This ratio is the highest (0.69) in Africa and the lowest (0.19) in South America (Potrter P.L., 2009).

According to Lythcott N. (2004), in 1995-1999 in California on average 48 new cases of invasive breast cancer and of Ca in situ were found in women under 50 per year, among them: 52.7/100,000 white, 48.4/100,000 black, 46.3/100,000 Asian and 35.2/100,000 Latin women. In women above 50, there was a sharp increase in invasive breast cancer and Ca in situ and, on average, reached 426.2/100,000, among them: 484.1/100,000 white, 372.2/100,000 black, 265.4/100,000 Asian and 256.9/100,000 Latin women.

Botha J.L. (2003) and his co-authors analyzed the tendency of breast cancer incidence and mortality in 16 European countries, in six of them there has been a breast screening program since the 1980s. In England, Wales, Scotland and Holland, there is a tendency for reduction in breast cancer mortality, which is connected with diagnosing cancer at its early stage and adequate treatment by screening.

M. McCracken and his co-authors (2007) studied the data provided by California Cancer Centre Registry concerning the main cancers (prostate, breast, lung, large intestine, stomach, liver, womb), the index of deaths related to the disease and the screening results in 5 main ethnic groups of Asian emigrants living in the State of California (the Chinese, Philippines, Vietnamese, Korean and Japanese). The authors point to certain differences in the structure of incidence and mortality according to ethnic affiliations. The highest index of breast cancer mortality was registered in Philippines and Japanese women.

Lacey J.V. et al. (2001) studied the indices of breast cancer incidence and mortality in the USA in 2001. In the USA in 2001, breast cancer made up 1/3 of the diagnostic cases and 15% of cancer mortality. In 2001 in the USA there were 192,000 registered cases of breast cancer incidence and 40,000 cases of mortality.

According to Katalinic A.et al. (2009), breast cancer is the most common form of cancer among German women. According to Population-Based Cancer Registry in Germany, there was an increase in breast cancer incidence till 2002, after which, as a result of improved early diagnostics and therapy, there was a reduction of this form of cancer by 6.8% till 2005. The maximum reduction of the disease was found in age group: 50-59 (12%). Compared to 1996-1997, in 2004-2005 the death rate reduced by 19%, especially (30%) among women under 55. The authors explained this tendency by the improvement of early detection and the reduction of hormonal therapy.

Based on the data provided by National Cancer Institute (NCI, Bethesda) and SEER program of Cancer Statistics, according to Altekruse S.F. et al. (2009), the average age of people having cancer in the USA is 61. In the USA, the cases of cancer by age are the following: in women under 20 – 0.0%, 20-34 – 1.9%, 35-44 – 10.5%, 45-54 – 22.6%, 55-64 - 24.1%, 65-74 – 19.5%, 75-85 – 15.8% and 85 and more – 5.6%. In the USA, in 2003-2007, the index of cancer cases per year by age was, on average, 122.9 per 100,000 women. At the same time, the highest level of cancer (126.5 per 100 000 women) was registered among white women, and the lowest (76.4%) – among American Indians and Alaska aboriginal women. Five-year surveillance during breast cancer corresponded to 98.0%, in case of regional distribution – 83.6%, and in case of distance metastases – 23.4%.

According to Pujol H. (2000), breast cancer has been the main concern for health system, despite some data provided by other authors concerning the decrease in breast cancer mortality in the countries which practice screening programs. The author studied the preventive role of Tamoxifen in the case of breast cancer. In the author's opinion, chemotherapy reduces the risk of development of cancer in the other breast by 40%, at the same time it increases the risk of development of endometrial cancer among healthy women.

Having analyzed the cases of cancer incidence and mortality all over the world in 1973-1997, Althuis M.D. et al. (2005) came to the conclusion that breast cancer is the main site of cancer and the main cause of death among women. The difference between the highest and the lowest levels of breast cancer is distinguished according to geographical area and ethnic affiliation. In 1973-1997, the lowest level of breast cancer (27/100 000) was found among Asian women, and the highest – in the USA among white women (97/100 000).

Gomez S.L. et al. (2010) studied the data gathered by California Cancer Registry and SEER program about the breast cancer incidence revealed in Asian (Chinese, Japanese, Philippines, Korean, Vietnamese) women living and born in the USA in 1988-2005. The Follow-up observation of the cases was conducted till 2007. The research results showed that among women born in the USA, despite their ethnic affiliation, there was the same index of death-rate. At the same time, the chance of surviving after treatment of breast cancer was higher among women born in the USA than among the first generation of Asian emigrants.

According to American Cancer Society (ACS), in 2007, there were 178 480 new cases of invasive breast cancer among female population of the USA. In the same year, 62 030 cases of breast cancer at stage CIS (stage 0) were revealed. In 2007, 40 460 women died by breast cancer in the USA.

According to American Cancer Society (ACS), in 2009, 192 370 new cases of invasive breast cancer were registered in female population of the USA. In the same year, 62,280 cases of breast cancer at stage CIS (stage 0) were revealed. In 2007, 40,170 women died of breast cancer in the USA.

Tyczynski J.E. at al. (2002) provided the data of European Network of Cancer Registry (ENCR, Lyon): worldwide, the most frequent site of cancer among women is breast. The highest frequency of breast cancer is found in North America, and the lowest – in Asia and Africa. Breast cancer is also the most frequent form of cancer among European women. In 2000, there were 350,000 new cases of breast cancer in Europe and 130,000 cases of cancer-related deaths. Breast cancer comprises 26.5% of cancer and 17.5% of cancer-related deaths.

According to the results of descriptive epidemiological research conducted by Baquet C.R. et al. (2008), in the USA, invasive breast cancer incidence is 1.16 times more frequent among black women under 40 than among white women. Breast cancer mortality was twice higher among black women under 40 than among white women. Statistically, compared to white women, among black women cancer is evidently found more frequently according to regional or distance distribution and, therefore, the index of the five-year survival rate was lower in the given case.

According to 2008 data by National Cancer Institute (NCI, Bethesda), among US women, breast cancer is the most widely-spread site of cancer and the main reason of cancer-related deaths. From 1990, there has been an increase in this form of cancer. Compared to other ethnic groups, breast cancer incidence is higher in white women, while cancer mortality is higher in black women. In the USA, the treatment of breast cancer costs 8.1 billion dollars a year. From 2003 to 2007, National Cancer Institute (NCI, Bethesda) increased the investments in breast cancer research from 548.7 million to 572.4 million US dollars.

According to Hall R.G. (2007), in Victoria region in Australia, in 2001 the burden of breast cancer among women's diseases was 5%, based on DALY index.

According to 2001 data of the health department of San Francisco, in San Francisco female population breast cancer ranked first in the structure of oncology diseases.

According to Woodcock J. et al. (2009), the focus of diseases in London female population was mainly presented by cardiovascular diseases (10-19%), cerebro-vascular insult (10-18%) and breast cancer (12-13%).

According to Murray J.L. et al. (2001), in 2000, breast cancer mortality reached 1.6% in European regions, 1.5% - in America, 2.0% - in high-income countries.

According to Reddy K.S. (2003), death or disability caused by chronic diseases at an average reproductive age is economically heavy for individuals, their families and, generally, the society of New Delhi. Considering prevention of breast cancer, the author recommends a wide use of self-examination.

Ljung R. et al. (2005) analyzed the general burden of diseases in Sweden using DALY's index. The authors came to the conclusion that 30% of all diseases among Swedish women are connected with social and economic differences while receiving medical service.

Therefore, breast cancer burden represents a vital problem for most countries in the world. Considering the social importance of the issue, it is important to specify breast cancer burden in Tbilisi female population.

**The aim of the research:**

Considering the actuality and social importance of the problem, it was necessary to specify breast cancer burden in Tbilisi. Based on Georgian University of Medical Sciences and the School of Social Healthcare, a descriptive research has been conducted within the scientific program of the university, on the topic: "Epidemiological evaluation of screening program of breast and cervical cancer in Tbilisi".

The research set the following tasks:

- ◊ to study the incidence of breast cancer in Tbilisi;
- ◊ to establish the structure of the causes of death and specify the share of breast cancer in Tbilisi female population.

**Target groups and methodology of research:**

There has been data on 13 286 cases of breast cancer in Tbilisi in 1998-2012 provided by the National Center for Disease Control and Public Health (NCDC). It is notable that in 2008-2010, on average 1 028 new cases were registered annually, but in 2011-2012 – just 187 cases. This sharp fall in the number of registered cases of breast cancer in 2011-2012 (only 18% of expected cases were registered) was connected with the disappearance of cancer registry system. Due to this fact, the data from 2011-2012 has been removed from the descriptive research. We have analyzed the data during a 13-year period (1998-2010) about 12 913 cases of breast cancer according to 5-year age groups. Tbilisi population registry provided information about 16 705 cases of female mortality in Tbilisi in 2002-2004, 2 977 of whom died of cancer, 845 - of breast cancer.

A descriptive epidemiological research has been conducted. It used the methodology recommended by International Agency of Researching Cancer (IARC, Lyon), International Association of Cancer Register (IACR, Lyon), European Network of Cancer Register (ENCR, Lyon) and the Union for International Cancer Control (UICC, Geneva) and SEER Program. The data base was processed statistically.

The following descriptive indicators have been calculated: 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.

We have analyzed the outcomes of the research, or descriptive indices, presented in the form of tables and graphs.

**Research results:**

1. **Breast cancer incidence burden in Tbilisi:**

During a 13-year period (1998-2010), 12 913 cases of breast cancer were registered in Tbilisi. According to crude rates, in Tbilisi, during a 13-year period (1998-2010), 167.4 per 100,000 women got breast cancer every year. Besides, according to crude rates in dynamics, compared to 1998-2010, 2003-2007 and 2008-2010, there was a rise in breast cancer incidence: from 149.9‰000 to 181.5‰000 and 173.3‰000 respectively.

According to Age-Standardized Rate (ASR), in Tbilisi, during a 13-year period (1998-2010) 122.9 per 100,000 women got breast cancer every year (95% CI ASR, 119,4-126,4) (see table 1).

Table1. The dynamics of breast cancer incidence in Tbilisi in 1998-2010, according to Age-Standardized Rates (ASR) per 100,000 women

| Years | ASR | SE | 95% CI ASR |
|---|---|---|---|
| 1998-2002 | 109,6 | 2,4 | 104,9-114,3 |
| 2003-2007 | 134,2 | 3,1 | 128,1-140,3 |
| 2008-2010 | 126,4 | 3,9 | 118,8-134,0 |
| 1998-2010 | 122,9 | 1,8 | 119,4-126,4 |

Besides, according to Age-Standardized Rate (ASR) in dynamics, compared to 1998-2010, in 2003-2007 and 2008-2010, there was an increase in breast cancer incidence: from 109,6‰000 (95% CI ASR,104,9-114,3) to 134,2‰000 (95% CI ASR, 128,1-140,3) and 126.4‰000 (95% CI ASR,118,8-134,0) respectively.

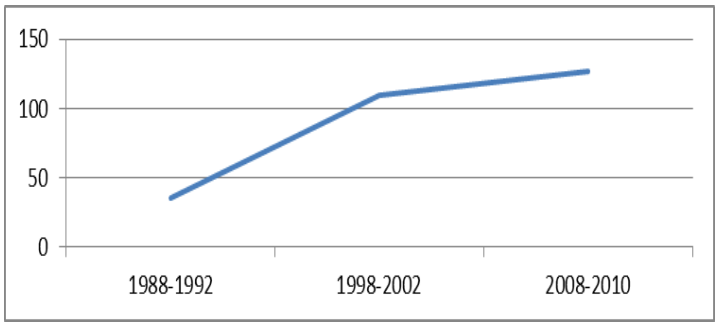
According to V. Tkeshelashvili's (2002) data, based on ASR, in Tbilisi in 1998-2010, 35.7 per 100,000 women (95% CI ASR, 33,9-37,5) got breast cancer.

Table2. The dynamics of breast cancer with 10-year intervals (1988-1992, 1998-2002, 2008-2010) according to the Age-Standardized Rate (ASR)

| Years | ASR | SE | 95% CIASR |
|---|---|---|---|
| 1988-1992 | 35,7 | 0,9 | 33,9-37,5 |
| 1998-2002 | 109,6 | 2,4 | 104,9-114,3 |
| 2008-2010 | 126,4 | 3,9 | 118,8-134,0 |

The dynamics of breast cancer during three 5-year periods with 10-year intervals is presented in Table 2 and Chart 1.

Chart 1. The dynamics of breast cancer with 10-year intervals according to the Age-Standardized Rate (ASR)




Following 1988-1992, there was a sharp rise in breast cancer incidence (1988-1992: ASR=35,7; 95% CI=21,0-33,9; 1998-2002: ASR=109,6; 95% CI=104,9-114,3).

It is true that from 1998-1992, there was a decrease in the development of this form, but, at the same time, till 2008-2010, there was an increase in distribution of the disease (2008-2010: ASR=126,4; 95% CI=118,8-134,0).

According to SRR, compared to 1988-1992, in 1998-2002, the frequency of breast cancer incidence increased three times (SRR=3,1; 95% CI SRR=2,8-3,5), while, compared to 1988-1992, in 2008-2010 – it increased 3.5 times (SRR=3,5; 95% CI SRR=3,1-4,0). This tendency continued in 2008-2010, compared to 1998-2002, though there was a decrease in this form of cancer (SRR=1,2; 95% CI SRR=1,1-1,3) (see Table 3).

Table3. The dynamics of breast cancer in Tbilisi according to Standardized Registration Ratio (SRR)

| Comparison of Periods | SRR | $\chi 2$ | 95% CI SRR |
|---|---|---|---|
| 1998-2002/ 1988-1992 | 3,1 | 807,9 | 2,8-3,5 |
| 2008-2010/ 1998-2002 | 1.2 | 13,9 | 1,1-1,3 |
| 2008-2010/ 1988-1992 | 3,5 | 514,2 | 3,1-4,0 |

According to SIR, compared to 1988-1992, in 1998-2002, breast cancer increased by 205% (SIR =305; 95% CI SIR=296,4-314,3), while compared to 1988-1992, in 2008-2010 – by 253% (SIR =353;95% CI SIR=340,5-365,4).

This tendency remained in 2008-2010, compared to 1998-1992, though this form of cancer decreased (SIR =116;95% CI SIR=111,5-119,7) (see Table 4).

Table 4. The dynamics of breast cancer in Tbilisi according to Standardized Incidence Ratios (SIR)

| Comparison of Periods | SIR | SE | 95% CI SIR |
|---|---|---|---|
| from 1998-2002 up to 2003-2007 | 305 | 4,6 | 296,4-314,3 |
| from2003-2007 up to 2008-2010- | 116 | 2,1 | 111,5-119,7 |
| from1998-2002 up to2008-2010 | 353 | 6,4 | 340,5-365,4 |

According to Age-Adjusted Rates (AAR) (Tbilisi Standard, 2002), during a 13-year period (1998-2010), 156.2 per 100,000 women got breast cancer in Tbilisi per year (see Table 5).

Table 5. The dynamics of breast cancer in Tbilisi according to Age-Adjusted Rates (AAR) (Tbilisi Standard, 2002) per 100,000 women

| # | Years | AAR | SE | 95% CI AAR |
|---|---|---|---|---|
| 1 | 1998-2002 | 140,1 | 2,1 | 136,0-144,3 |
| 2 | 2003-2007 | 169,6 | 2,3 | 165,0-174,1 |
| 3 | 2008-2010 | 160,7 | 2,9 | 155,0-166,4 |
| T | 1998-2010 | 156,2 | 1,4 | 153,5-158,9 |

Besides, according to Age-Adjusted Rates (AAR) in dynamics, compared to 1998-2002, in 2003-2007 and 2008-2010, there was an increase in breast cancer incidence: from 140.1‰000 to 160,7‰000.

According to Truncated Age-Standardized Rates ($TASR_{30-69}$), in Tbilisi, during a 13-year period (1998-2010),in age group: 30-69, 269.5 (95% CI=250,6-288.3) per 100 000 women had breast cancer each year (see Table 6).

Table 6. In 1998-2010, the dynamics of breast cancer in Tbilisi according to Truncated Age-Standardized Rates ($TASR_{30-69}$) per 100,000 women

| Years | $TASR_{30-69}$ | SE | 95% CI $TASR_{30-69}$ |
|---|---|---|---|
| 1998-2002 | 239,1 | 9,0 | 221,5-256,8 |
| 2003-2007 | 293,6 | 10,0 | 274,0-313,2 |
| 2008-2010 | 264,9 | 9,8 | 245,7-284,1 |
| 1998-2010 | 269,5 | 9,6 | 250,6-288,3 |

Besides, according to Truncated Age-Standardized Rates (TASR) in dynamics, compared to 1998-2002, in 2008-2010, there was an increase in breast cancer incidence in age group: 30-69: from 239,1%000 (95% CI TASR=221,5-256,8) to 264,9%000 (95% CI TASR=245,7-284,1).

Table 7. Cumulative Risk ($CR_{0-74}$) of breast cancer in Tbilisi in 1998-2010

| Years | $CR_{0-74}$ | $SE_{Cum.Rate}$ | 95% CI $CR_{0-74}$ |
|---|---|---|---|
| 1998-2002 | 11,8 | 0,21 | 11,1-12,1 |
| 2003-2007 | 14,3 | 0,23 | 13,3-14,7 |
| 2008-2010 | 13,4 | 0,29 | 12,5-13,9 |
| **1998-2010** | **13,1** | **0,14** | **12,3-13,3** |

Cumulative Risk index ($CR_{0-74}$) of breast cancer among the women living in Tbilisi was 13.1% during a 13-year period (1998-2010). Besides, in dynamics, compared to 1998-2002, in 2003-2007, there was an increase in Cumulative Risk index ($CR_{0-74}$): from 11,8% (95% $CICR_{0-74}$= 11,1-12,1) to 14,3%(95% $CICR_{0-74}$= 13,3-14,7) (see Table 7).

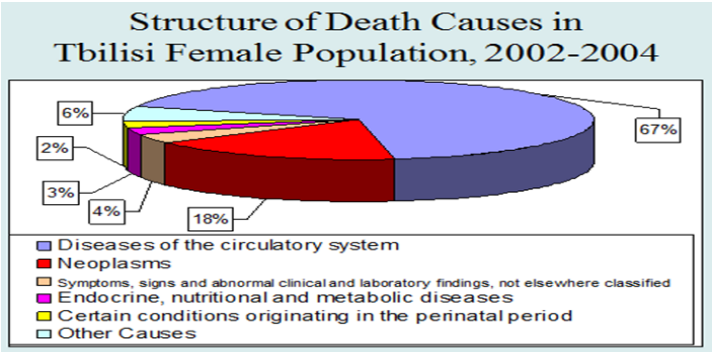
Table 8. Causes of Death in Tbilisi Female Population, 2002-2004

**2. The structure of death in Tbilisi female population:**

In 2002-2004, there were 16 705 registered cases of mortality in Tbilisi female population. The average life span in Tbilisi female population was 70.

The deaths caused by malignant neoplasm of breast ranked second after circulatory system and its share in death structure was 18% (see Table 8 and Chart 2).

In Tbilisi female population, 9 out of 10 causes of mortality are connected with circulatory system diseases. The main cause of death is breast cancer (ICD-10: C50) as well, which ranks fourth in 10 main causes of death in Tbilisi female population of all ages and its share is 5% of all deaths. Chart 2.




| # | System | All Ages | Crude Rate | % | ASR World | ICD-10 |
|---|---|---|---|---|---|---|
| 1 | Deseases of the circulatory system | 11191 | 628.9 | 67.0 | 504.5 | I00-I99 |
| **2** | **Neoplasms** | **2977** | **167.3** | **17.8** | **142.8** | **C00-D48** |
| 3 | Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified | 602 | 33,8 | 3,6 | 31,8 | R00-R99 |
| 4 | Endocrine, nutritional and metabolic diseases | 457 | 25,7 | 2,7 | 18,6 | E00-E90 |
| 5 | Certain conditions originating in the perinatal period | 417 | 23,4 | 2,5 | 0,2 | P00-P96 |
| 6 | Diseases of the digestive system | 281 | 15,8 | 1,7 | 11,8 | K00-K93 |
| 7 | External causes of morbidity and mortality | 212 | 11,9 | 1,3 | 11,1 | V01-Y98 |
| 8 | Deseases of the respiratory system | 205 | 11,5 | 1,2 | 7,3 | J00-J99 |
| 9 | Certain infectious and parasitic diseases | 116 | 6,5 | 0,7 | 3,6 | A00-B99 |
| 10 | Diseases of the genitourinary system | 77 | 4,3 | 0,5 | 3,6 | N00-N99 |
| 11 | Injury, poisoning and certain other consequences of external causes | 54 | 3,0 | 0,3 | 2,1 | S00-T98 |
| 12 | Diseases of the nervous system | 51 | 2,9 | 0,3 | 2,6 | G00-G99 |
| 13 | Congenital malformations, deformations and chromosomal abnormalities | 26 | 1,5 | 0,2 | 0,0 | Q00-Q99 |
| 14 | Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 8 | 0,5 | 0,0 | 0,6 | D50-D89 |
| 15 | Mental and behavioural disorders | 6 | 0,3 | 0,0 | 0,5 | F00-F99 |
| 16 | Pregnancy, childbirth and the puerperium | 5 | 0,3 | 0,0 | 0,1 | O00-O99 |
| 17 | Diseases of the skin and subcutaneous tissue | 4 | 0,2 | 0,0 | 0,2 | L00-L99 |
| 18 | Diseases of the musculoskeletal system and connective tissue | 3 | 0,2 | 0,0 | 0,1 | M00-M99 |
| 19 | Diseases of the ear and mastoid process | 1 | 0,1 | 0,0 | 0,1 | H60-H95 |
| | ICD unknown | 12 | 0,7 | 0,1 | 0,3 | unknown |
| **All Causes** | | **16705** | **938,8** | **100,0** | **625,0** | **All** |

Table 9. 10 Main Causes of Death in Tbilisi Female Population, 2002-2004

| # | SITE/Cause | All Ages | CrudeRate | % | ASR World | AAR (2002 Tbilisi Standard) | ICD 10th |
|---|---|---|---|---|---|---|---|
| 1 | Chronic ischaemic heart disease | 3735 | 209,9 | 22,4 | 115,0 | 170,3 | I25 |
| 2 | Stroke, not specified as haemorrhage or infarction | 1866 | 104,9 | 11,2 | 59,2 | 87,0 | I64 |
| 3 | Heart failure | 1414 | 79,5 | 8,5 | 47,3 | 66,6 | I50 |
| **4** | **Malignant neoplasm of breast** | **845** | **47,5** | **5,1** | **33,2** | **43,2** | **C50** |
| 5 | Other acute ischemic heart diseases | 894 | 50,2 | 5,4 | 27,6 | 40,8 | I24 |
| 6 | Intracerebral haemorrhage | 830 | 46,6 | 5,0 | 26,8 | 38,7 | I61 |
| 7 | Essential (primary) hypertension | 537 | 30,2 | 3,2 | 16,5 | 24,6 | I10 |
| 8 | Acute myocardial infarction | 432 | 24,3 | 2,6 | 15,4 | 21,0 | I21 |
| 9 | Hypertensive heart disease | 465 | 26,1 | 2,8 | 14,0 | 21,3 | I11 |
| 10 | Atherosclerosis | 423 | 23,8 | 2,5 | 13,4 | 19,0 | I70 |

In 2002-2004, there were 845 registered cases of death caused by breast cancer, in other words, each year, according to crude rates, 48 per 100 000 Tbilisi female citizens die of breast cancer, according to Age-Standardized Rates – 33, and according to Truncated Age-Standardized Rates (Tbilisi Standard) - 43.

Chart 3

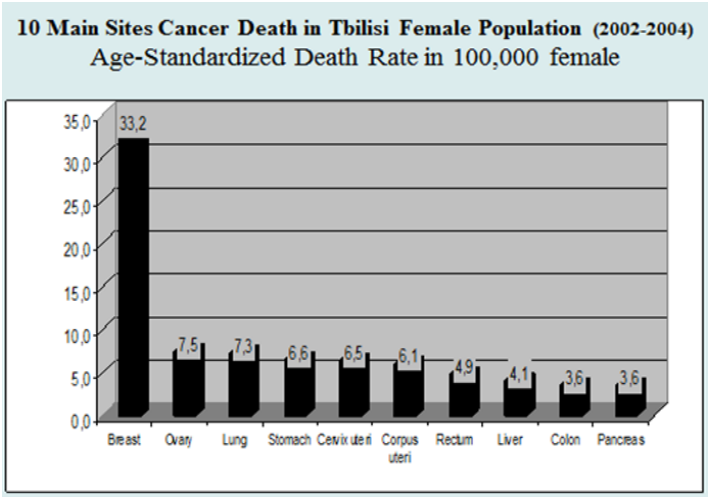
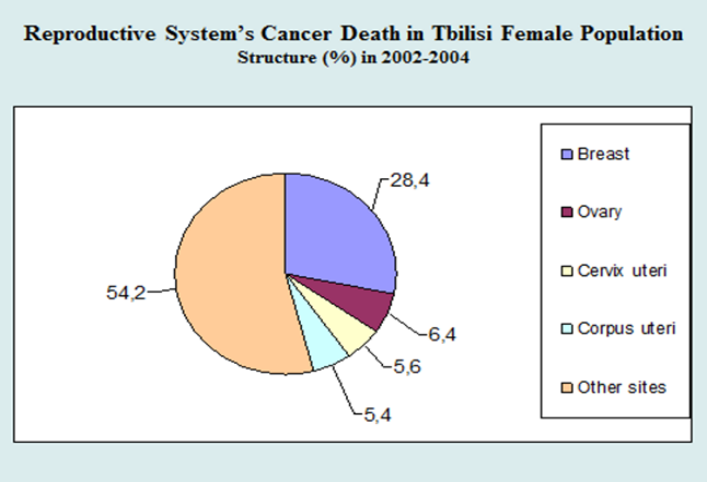



Chart 3 presents the order of 10 main sites of cancer-related deaths per 100 000 women in Tbilisi female population in 2002-2004, according to Age-Standardized Death Rates (World standard):

In 2002-2004, the structure of cancer-related deaths in Tbilisi female population (10 main forms, according to Age-Standardized Rates per 100 000 women): 1. Breast - 33.2‰; 2. Ovary - 7.5‰; 3. Lung – 7.3‰; 4. Stomach – 6.6‰; 5. Cervix uteri - 6.5‰; 6. Corpus uteri - 6.1‰; 7. Rectum - 4.9‰; 8. Liver – 4.1‰; 9. Colon - 3.6‰; 10. Pancreas - 3.6‰.

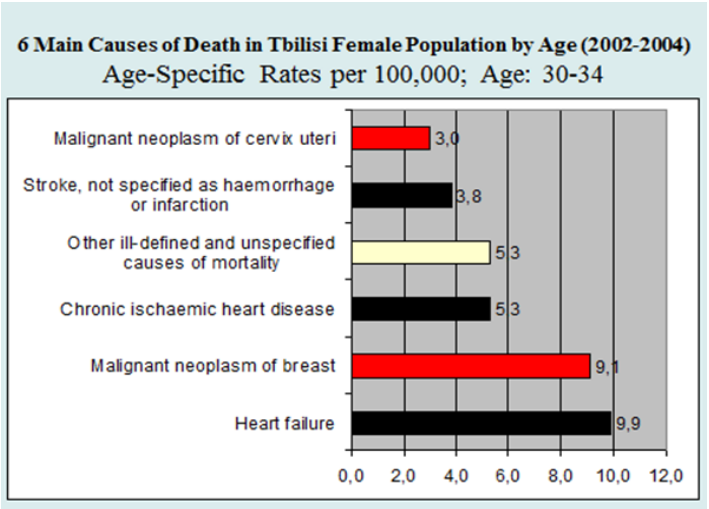
Almost half of the cases (45.8%) in the structure of cancer-related mortality in Tbilisi female population are organs of reproductive system, including: breast - 28,4%, ovary- 6,4%, cervix uteri- 5,6%, corpus uteri- 5,4% (Chart 4).

Chart 4.



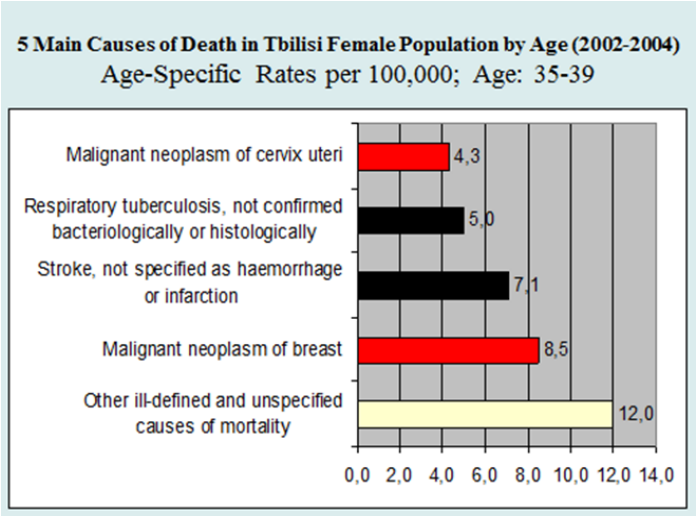

For effective preventive approach to the management of social healthcare, one of the most interesting issues for representatives of any field of medicine is the analysis of structure of death causes by age. In other words, while studying death structure, it is very important to establish the index of age-specific death rate in every 5-year age group per 100 000 citizens. This is possible by presenting it in a graphic form by comparing the levels of their importance.

Chart 5.



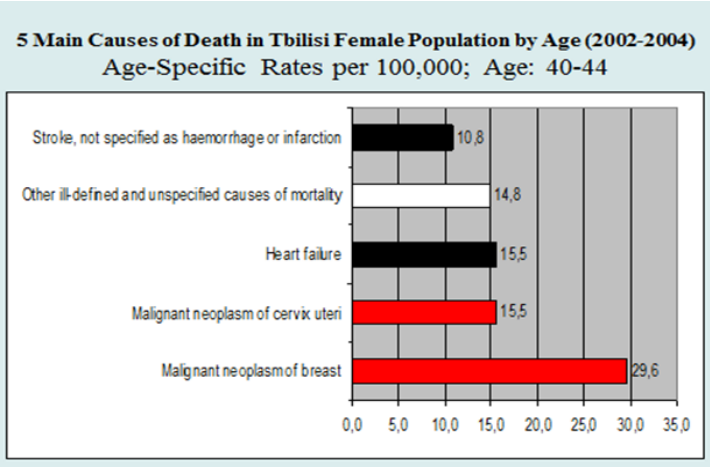

In the structure of 5 main causes of death in women of age group: 30-34, alongside diseases of circulatory system, there are breast (9,1‰) and cervix uteri (3,0‰) cancers which rank second and fifth respectively. 29.4% of deaths in women of this age were connected with cancer (ranked first), while 28.3% - to the diseases of circulatory system (ranked second). 10.4% of deaths in women of this age was connected with external reasons, 6.6% were caused by digestive system, and 25.3% - by other forms of disease (Chart 5).

Chart 6



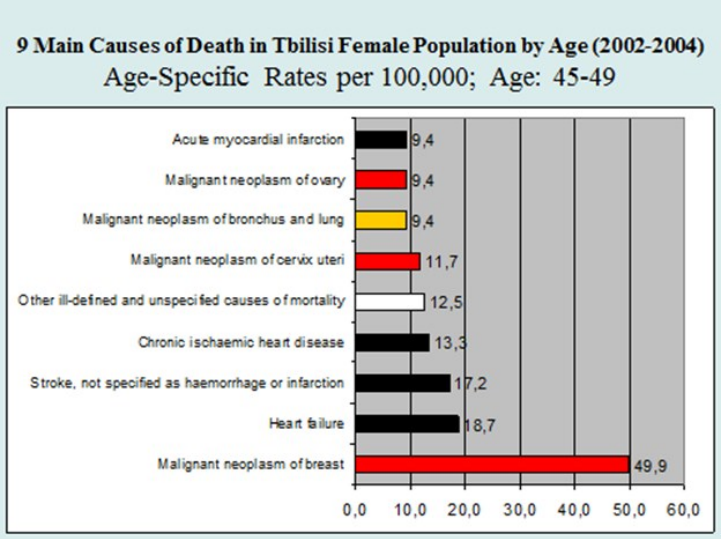

In the structure of death in Tbilisi female population in age group: 35-39, after studying non-verified causes of mortality, in 5 main causes breast (8,5‰) and cervix uteri (4,3‰) cancers ranked first and fourth respectively. Every 3rd death (37.6%) in women of this age was caused by cancer. In the structure of causes of death, cancer ranked first. The frequency of cancer-related deaths is 1.9 times more than the diseases of circulatory system which ranked second (19.6%) and 5.2 times more than infectious diseases which ranked third (7.2%). In women of this age, 6.5% of deaths were connected with external reasons. In age group: 35-39, 17.4% of fatal cases were caused by other diseases, and 11.7% - were not identified at all (Chart 6).

Chart 7.



In the structure of death in Tbilisi female population in age group: 40-44, in 5 main causes, breast (29,6%000) and cervix uteri (15,5%000) cancers ranked first and second respectively. In women of this age, 43.6% of deaths were connected with cancer which ranked first in the structure of death. The frequency of cancer-related deaths is 1.7 times more than the diseases of circulatory system (25.6%) which was second. In women of this age, 6.5% of fatal cases were caused by external causes. In women aged 40-44, 15.8% of death were caused by other diseases and 8.4% - were not identified at all (Chart 7).

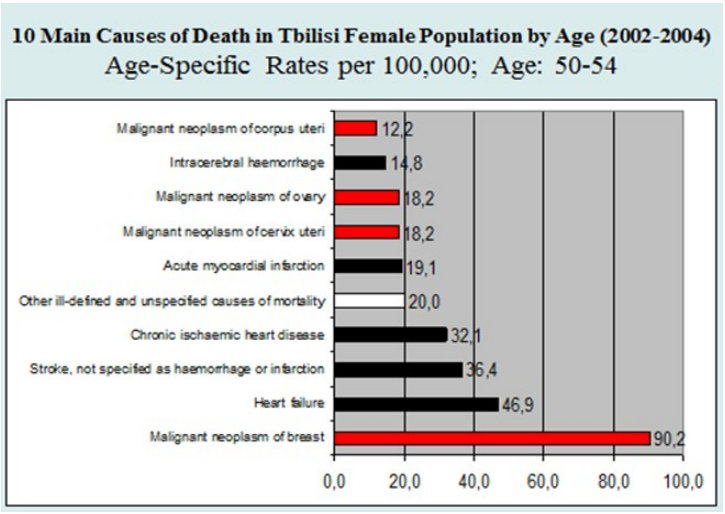
Chart 8.




In the structure of death in Tbilisi female population in age group: 45-49, among 5 main causes breast (29,6%000) and cervix uteri (15,5%000) cancers ranked first and fifth respectively. 43.6% of deaths in women of this age were connected with cancer which was first in the structure of causes of death. The frequency of cancer-related deaths is 1.7 times more than the diseases of circulatory system which rank second (25.6%). In women of this age, 6.5% of deaths were connected with external reasons. In age group: 45-49, 15.8% of fatal cases were caused by other diseases, and 8.4% - were not identified at all (Chart 8).

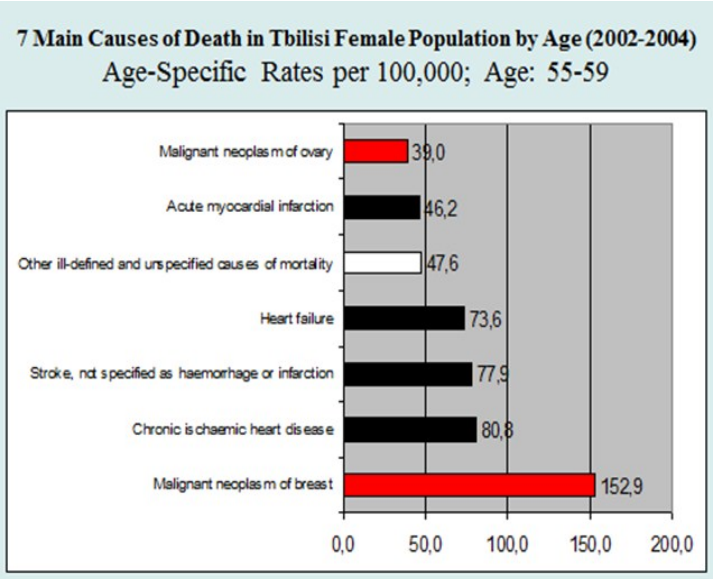
In the structure of death in Tbilisi female population in age group: 50-54, 4 out of 10 main causes were cancers of four forms of reproductive system, and five were presented by circulatory system.

Chart 9.



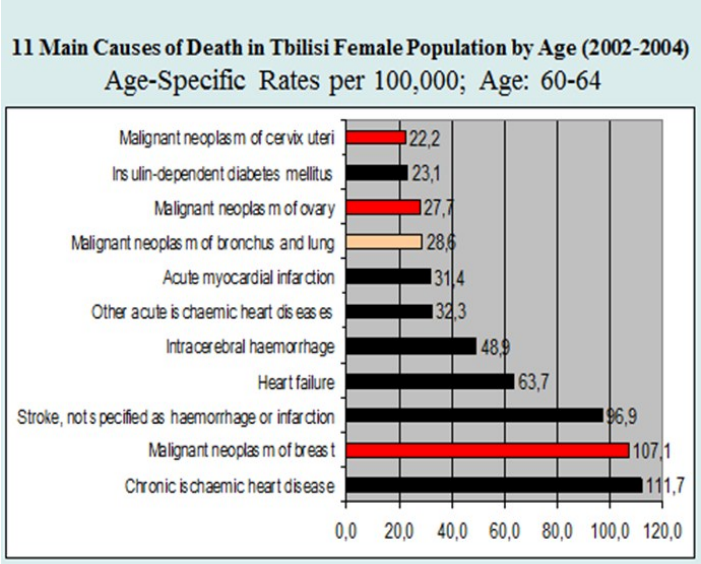

According to the structure of death in women of this age, cancer was presented in the following sites: I – breast (90,2%000), VII-VIII – Cervix Uteri (18,2%000) and Ovary (18,2%000), X – Corpus Uteri (12,2%000). It should be mentioned that the frequency of breast cancer is 1.9 times more than heart failure (46,9%000) which ranked second in the cases of death in women of this age. The frequency of cancer mortality (46.0%) was first, which was 1.2 times more than the diseases of circulatory system (37,9%) which ranked second and 15.3 times more than the diseases of digestive system (3.0%). In 8.7% of fatal cases in women aged 50-54, the death was caused by other forms of disease (Chart 9).

Chart 10 .



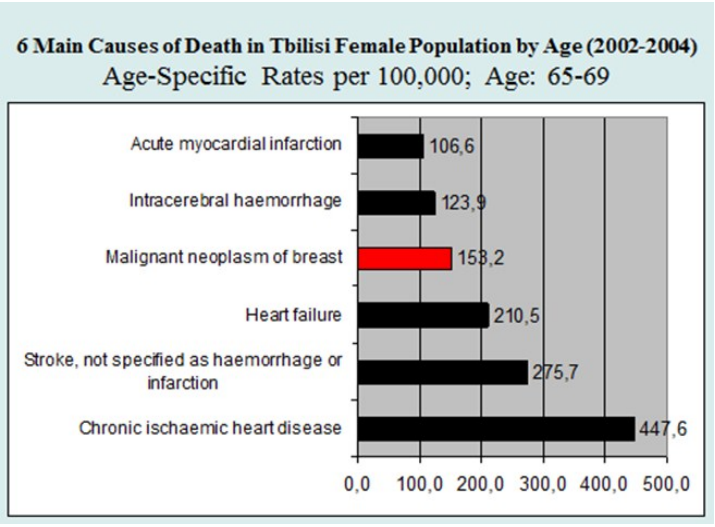
In the structure of death in Tbilisi female population in age group: 55-59, breast (152,9%000) and ovary (39,0% 000) cancers ranked first and seventh respectively in 7 main causes. It should be noted that the frequency of breast cancer-related death in women of this age was 1.9 times more than chronic ischemic heart disease (80,8% 000) which ranked second in this structure. In women of this age, 47.2% of mortality were connected with cancer which was first in the structure of death causes. The frequency of cancer-related deaths was 1.2 times more than the diseases of circulatory system (38,7%) which ranked second. In women of this age, 2.4% of mortality was connected with the diseases of digestion system, 2.0% - with external causes. 5.1% of fatal cases in women of age group: 55-59, the death was caused by other diseases (Chart 10).

Chart 11.



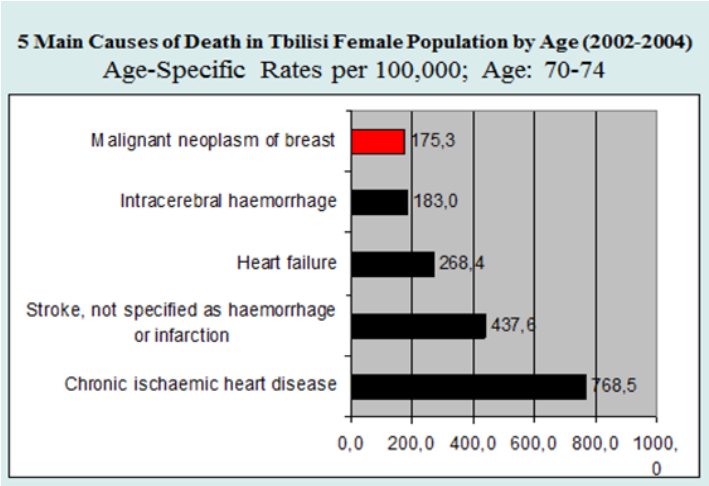

In the structure of death in Tbilisi female population in the age group: 60-64, 4 out of 11 causes of death were different forms of cancer, three of which were three forms of reproductive system. In the structure of death in women of this age, malignant neoplasm was presented in the following forms: the second was breast (107,1%000), the eighth – lung (28,6%000), the ninth –ovary (27,7%000) and the eleventh - cervix uteri (22,2%000). It should be noted that the frequency of breast cancer-related mortality in women of this age-group was just insignificantly less than the chronic ischemic heart disease (111,7%000) which ranked first in the structure. The share of cancer caused deaths (36.6%) was just 1.3 times less than the diseases of circulatory system (48.7%) which was first in the death structure, while it was 7.3 times more than endocrinology and metabolic diseases (5,0%), which ranked third. 7.0% of mortality in women of age group: 60-64 were caused by other diseases and the causes of 2.7% of deaths were not identified at all (Chart 11).

Chart 12.



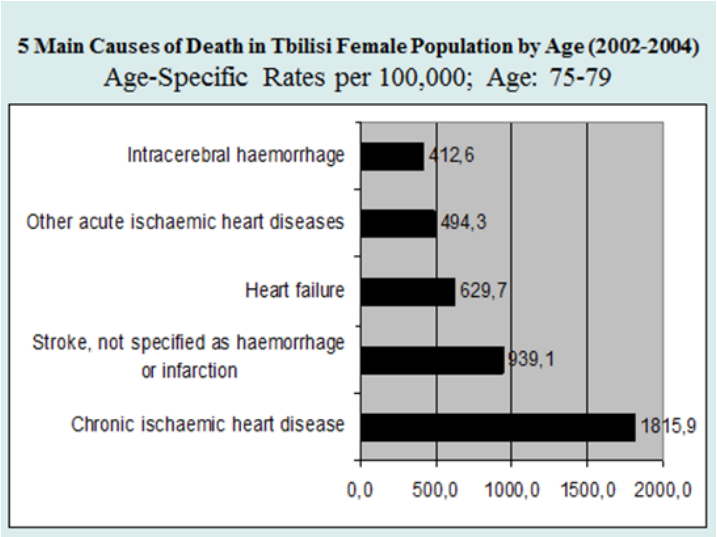

In the structure of death in Tbilisi female population in age group: 65-69, breast cancer (153.2%000) ranks only fourth in the main causes of death. The share of deaths caused by cancer (24.9%) was 2.5 times less than the diseases of circulatory system (61.6%) which was first in the death structure, while it was 5.2 times more than endocrinology and metabolic diseases (4.8%), which ranked third. In women of this age, 2.1% of deaths were connected with the diseases of digestion system, 4.3% - with other diseases and 2.5% of the causes were not identified at all (Chart 12).

Chart 13.



In the structure of death in Tbilisi female population in age group: 70-74, breast cancer (175,3%000) ranked only fifth in the main causes of death. The share of cancer-caused mortality (18,6%) was 3.8 times less than the diseases of circulatory system (70,6%) which ranked first in the death structure, while it was 4.5 times more than endocrinology and metabolic diseases (4,1%), which ranked third. In women of this age, 2.2% of deaths were connected with the diseases of digestion system, 2.7% - with other diseases and 1.7% of the causes were not identified at all (Chart 13).

Chart 14.




In the structure of death in Tbilisi female population at the age of 75-79, breast cancer is not included in the five main causes of death. The share of breast cancer-related death is reduced to 12.2% and was 6.5 times less than the diseases of circulatory system (79,4%), which ranked first and 4.2 times more than endocrinology and metabolic diseases (2.9%), which ranked third. In women of 75-79, 1.4% of mortality were caused by diseases of digestive system, 2.0% - by other diseases, and 2.1% of causes were not identified at all (Chart 14).

In the structure of death in Tbilisi female population aged 80-84, breast cancer (215,6%000) ranks tenth in 10 main causes of mortality. The share of death caused by cancer is reduced to 5.0% and is 17.2 times less than the diseases of circulatory system, which ranked first and whose share reaches its peak and constitutes 86.0%. The share of endocrine and metabolic diseases, which ranked third, is 1.6%. Death caused by respiratory and digestive systems was registered with the same index – 0.7%.

In the death structure in Tbilisi female population of age group: 85 and more, breast cancer (185,4%000) ranks twelfth. The share of cancer-related death is reduced to 2.6% and is 34 times less than the diseases of circulatory system which ranks first, whose share reaches its peak and makes up 88.3%.

The mortality of Tbilisi populationcaused by cancer of reproductive system: in the structure of death caused by cancer in Tbilisi female population, nearly half of the death cases (45.8%) come on organs of reproductive system, including: breast – 28.4%, ovary – 6.4%, cervix uteri – 5.6%, corpus uteri – 5.4%. In 2002-2004, there were 845 registered cases of mortality caused by breast cancer, in other words, each year, 48 per 100 000 women in the capital died of this cause according to crude rates, 33 women died according to Age-Standardized Rate (world standard) and 43 - according to Age-Adjusted Rate (Tbilisi Standard).

In the structure of deaths caused by cancer in women over 25, breast cancer ranks first. At the same time, at a later period, 35-59, breast cancer is again the first in the structure of different causes of death. At 60 and more, breast cancer moves to the 2nd,4th, 5th, 9th and, at 80, to the 10th place.

In the 25-year-period (35-59), beast is the main form of cancer and it represents the main cause of death in Tbilisi female population! Except breast, the following organs of reproductive system belong to 10 mainly effected organs: ovary, cervix uteri and corpus uteri.

### 3. Summary: Breast Cancer Burden in Tbilisi

In the structure of cancer diseases among women, the leading part belongs to breast cancer. The issue of breast cancer has long gone beyond the frames of healthcare and acquired a vital social importance that is why the struggle against breast cancer is the first and foremost concern for healthcare and social sphere.

According to GLOBOCAN (2013), in 2008, 1 384 000 new cases of breast cancer incidence and 458 000 cases of mortality were registered worldwide.

At the same time, people usually get cancer at the optimal age of their professional and creative development (45-64), when their activity has the greatest effect. Therefore, cancer does huge financial harm to the country's economy and prevents the speed of its development.

Due to social orientation and economic effectiveness, prevention of disease and early diagnostics are regarded to be the priority concerns of the XXI century by World Health Organization (WHO, Geneva). According to World Health Organization, the present level of medical development makes it possible to reduce cancer incidence by one-third, one-third of the people suffering from cancer are potentially curable, and in one-third of the cases, adequate palliative care makes it possible to prolong the patients' lives and improve their life quality.

In order to specify the number of cancer incidence and the frequency of cancer mortality, there has been a descriptive epidemiological research in Tbilisi.

During a 13-year period (1998-2010), 12,913 cases of breast cancer were registered in Tbilisi.

According to crude rates, in Tbilisi, during a 13-year period (1998-2010), 167.4 per 100 000 women got cancer each year. Besides, according to crude rates in dynamics, compared to 1998-2002, in 2003-2007 and 2008-2010, there was an increase in breast cancer incidence: from 149.9% 000 to 181.5%000 and 173%000 respectively.

According to Age-Standardized Rates (ASR), in Tbilisi, each year during a 13-year period (1998-2010), 122.9 per 100 000 women got breast cancer (95% CI ASR, 119,4-126,4). At the same time, according to Age-Standardized Rates (ASR) in dynamics, compared to 1998-2002, in 2003 -2007 and 2008-2010, there was an increase in the number of breast cancer: from 109.6%000 (95% CI ASR, 104,9-114,3) to 134.2%000 (95% CI ASR, 128,1-140,3) and 126.4%000 (95% CI ASR, 118,8-134,0) respectively.

After 1988-1992, while comparing periods with 10-year intervals, there was a notable increase in breast cancer (1988-1992: ASR=35,7; 95% CI=33,9-37,5; 1998-2002: ASR=109,6; 95% CI=104,9-114,3). It is true that from 1998-2002, the speed decreased a little, but it continued to steadily increase till 2008-2010 (2008-2010: ASR=126,4; 95% CI=118,8-134,0).

According to SRR, compared to 1988-1992, in 1998-2002, cases of breast cancer increased 3 times (SRR=3,1; 95% CI SRR =2,8-3,5), and, compared to 1988-1992, in 2008-2010 it increased 3.5 times (SRR=3,5; 95% CI SRR=3,1-4,0). This tendency was preserved in 2008-2010, compared to 1998-2002, though there was a decrease in cancer of this form (SRR=1,2; 95% CI SRR=1,1-1,3).

According to SIR, compared to 1988-1992, in 1998-2002, breast cancer incidence increased by 205% (SIR =305; 95% CI SIR=296,4-314,3), and, compared to 1988-1992, in 2008 -2010 – by 253% (SIR =353; 95% CI SIR=340,5-365,4). This tendency remained in 2008-2010 compared to 1998-202, though there was a fall in the number of cancer of this form (SIR =116;95% CI SIR=111,5-119,7).
According to Age-Adjusted Rates (AAR) (Tbilisi Standard, 2002), every year during a 13-year period (1998-2010), 158.2 per 100 000 women got breast cancer in Tbilisi. Besides, according to Age-Adjusted Rates (AAR) in dynamics, compared to 1998-2002, in 2003-2007 and 2008-2010, there was an increase in breast cancer incidence from 140,1%000 to 160,7%000.

According to Truncated Age-Standardized Rates ($TASR_{30-69}$), every year during a 13-year period (1998-2010), 269.5 (95% CI=250,6-288,3) women of age group: 30-69 per 100 000 got breast cancer in Tbilisi. Besides, according to Truncated Age-Standardized Rates (TASR) in dynamics, compared to 1998-2002, in 2008-2010, in age group: 30-69, there was an increase in the number of breast cancer: from 239,1%000 (95% CITASR =221,5-256,8) to 264,9%000 (95% CITASR =245,7-284,1).

Cumulative Risk ($CR_{0-74}$) of breast cancer in Tbilisi female population during a 13-year period (1998-2010), made up 13.1%. Besides, in dynamics, compared to 1998-2002, in 2003-2007, there was an increase in Cumulative Risk ($CR_{0-74}$) of breast cancer: from 11.8% (95% $CICR_{0-74}$= 11,1-12,1) to 14.3% (95% CI $CR_{0-74}$= 13,3-14,7).

In 2002-2004, there were 16 705 cases of deaths registered in Tbilisi female population. The average life span in Tbilisi female population made up 70 years.

Deaths caused by malignant neoplasm ranked second in the structure of death after circulatory system and its share made up 18%.

Nine out of ten main death causes in Tbilisi female population are connected with the diseases of circulatory system. The main cause of death is also breast cancer (ICD-10: C50), which ranks fourth in 10 main causes of death in Tbilisi female population and its share makes up 5% of cancer-related deaths.

In 2002-2004, there were 845 registered deaths caused by breast cancer in Tbilisi female population, or, annually 48 per 100 000 women die according to crude rates, 33 women die according to Age Standardized Rates, and 43 women - according to Age-Adjusted Rates (Tbilisi Standard).

The structure of death caused by cancer in Tbilisi female population in 2002-2004 was the following (10 main forms according to Age-Standardized Rates per 100 000 women): 1. breast – 33.2%000; 2. ovary – 7.5%000; 3. lung – 7.3% 000; 4. stomach – 6.6%000; 5. cervix uteri – 6.5%000; 6. corpus uteri – 6.1%000; 7. rectum – 4.9%000; 8. liver – 4.1%000; 9. colon - 3.6%000; 10. pancreas – 3.6%000.

Nearly half (45.8%) of cancer-relateddeaths in Tbilisi female population are of organs of reproductive system, including: breast – 28.4%, ovary – 6.4%, cervix uteri – 5.6%, corpus uteri – 5.4%.

In the structure of 5 main causes of death in women aged 30-34, alongside diseases of circulatory system, breast (9.1%000) and cervix uteri (3.0%000) cancers rank second and fifth respectively. 29.4% of mortality in women of this age were connected with cancer (ranking first), and 28.3% - with the diseases of circulatory system (ranking second).

In the structure death in Tbilisi female population aged 35-39, after studying non-verified cases of mortality, among 5 main causes of death, breast (8.5%000) and cervix uteri (4.3%000) cancers ranked first and fourth, respectively. About 37.6% of deaths in women of this age were caused by cancer. In the structure of death causes, cancer was the first. The frequency of cancer related deaths was 1.9 times more than the diseases of circulatory system which ranked second (19.6%) and 5.2 times more than infectious diseases which ranked third (7.2%).

In the structure of death in Tbilisi female population aged 40-44, among 5 main causes of death, breast (29.6%000) and cervix uteri (15.5%000) cancers rank first and second, respectively. About 43.6% of deaths in women of this age were connected with cancer which ranked first in the structure of death causes. The frequency of cancer-related deaths was 1.7 times more than the diseases of circulatory system which ranked second (25.6%).

In the structure death in Tbilisi female population aged 45-49, among 5 main causes of death,breast (29.6%000) and cervix utery (15.5%000) cancers ranked first and fifth, respectively. About 43.6% of deaths in women of this age were connected with cancer which ranked first in the structure of death causes. The frequency of deaths caused by cancer was 1.7 times more than the diseases of circulatory system which ranked second (25.6%).

In the structure death in Tbilisi female population aged 50-54, among 10 main causes of death, four of them were four different forms of the organs of reproductive system, five – the diseases of circulatory system. According to ranks in the structure of death causes in women of this age, cancer of reproductive system was presented in the following forms: I – breast (90.2%000), VII-VIII – cervix uteri (18.2%000) and ovary (18.2%000), X – corpus uteri (12.2% 000). It should be noted that in women of this age, the frequency of cancer-related deaths was 1.9 times more than those caused by heart failure which ranked second (46.9% 000). The frequency of cancer-related mortality (46.0%) ranked first, it was 1.2 times more than the diseases of circulatory system which ranked second (37.9%) and 15.3 times more than the diseases of digestive system which ranked third (3.0%).

In the structure of death in Tbilisi female population aged 55-59, among 7 main causes of death, breast (152.9%000) and ovary (39.0%000) cancers ranked first and seventh, respectively. It should be noted that the frequency of cancer-related deaths was 1.9 times more than chronic ischemia heart disease (80.8%000) which ranked second among causes of death in women of this age. About 47.2% of deaths in women of this age were connected with cancer that ranked first in the structure of death causes. The frequency of cancer mortality was 1.2 times more than the diseases of circulatory system which ranked second (38.7%).

In the structure of death in Tbilisi female population aged 60-64, four out of 11 main causes of death were cancer and three of them were 3 forms of cancer of reproductive system. In the structure of death in women of this age, according to ranks, malignant neoplasm was presented with the following forms: II– breast (107,1%000), VIII – lung (28,6%000), IX – ovary (27,7%000) and XI – cervix uteri (22,2%000). It should be noted that the frequency of cancer mortality was just insignificantly less than chronic ischemia heart disease which ranked first (111,7%000) in women of this age. The share of cancer mortality (36.6%) was not much behind (1.3 times) the diseases of circulatory system which ranked first (48,7%), while it was 7.3 times more than endocrine and metabolic diseases (5.0%) which were the third.

In the structure of death in Tbilisi female population in age group: 65-69, breast cancer (153.2%000) is only the 4th in the main causes of death. The share of deaths caused by cancer (24.9%) was 2.5 times less than the diseases of circulatory system (61.6%) which ranked first in the death structure, while it was 5.2 times more than endocrinology and metabolic diseases (4.8%), which ranked third.

In the structure of death in Tbilisi female population in age group: 70-74, breast cancer (175,3%000) only ranks fifth in the main causes of death. The share of cancer mortality (18,6%) was 3.8 times less than the diseases of circulatory system (70,6%) which ranked first in the death structure, while it was 4.5 times more than endocrinology and metabolic diseases (4,1%), which were the third.

In the structure of death in Tbilisi female population at the age of 75-79, breast cancer is not included in the five main causes of death. The share of breast cancer mortality was reduced to 12.2% and was 6.5 times less than the diseases of circulatory system (79,4%), which ranked first and 4.2 times more than endocrinology and metabolic diseases (2.9%).

In the structure of death in Tbilisi female population aged 80-84, breast cancer (215,6%000) ranked tenth in 10 main causes of death. The share of death caused by cancer is reduced to 5.0% and is 17.2 times less than the diseases of circulatory system, which rank first and whose share reaches its peak and makes up 86.0%. The share of endocrine and metabolic diseases, which rank third, is 1.6%.

In the death structure in Tbilisi female population of age group: 85 and more, breast cancer (185,4%000) is only the 12th. The share of cancer-related death is reduced to 2.6% and is 34 times less than the diseases of circulatory system, which ranked first, whose share reaches its peak and makes up 88.3%.

The mortality of Tbilisi population caused by cancer of reproductive system: in the structure of death caused by cancer in Tbilisi female population, nearly half of the death cases (45.8%) come on organs of reproductive system, including: breast – 28.4%, ovary – 6.4%, cervix uteri – 5.6%, corpus uteri – 5.4%. In 2002-2004, there were 845 registered cases of breast cancer mortality, in other words, every year,48 per 100,000 women died of this cause according to crude rates, 33 women died according to Age-Standardized Rate (world standard) and 43 - according to Age-Adjusted Rates (Tbilisi Standard).

In the structure of cancer-related deaths in women over 25, breast cancer ranks first. At the same time, at a later period, 35-59, breast cancer again ranks first in the structure of different causes of death. At 60 and more, breast cancer moves to the 2nd,4th, 5th, 9th and, at 80, to the 10th place.

In the 25-year-period (35-59), beast is the main form of cancer and it represents the main cause of mortality in Tbilisi female population!

**Conclusions:**

1. The issue of breast cancer in Tbilisi female population is an important medical and social problem.
2. The frequency of breast cancer incidence (ASR=123% 000; AAR=158%000) and mortality (ASR=33%000; AAR=43%000) corresponds to the average index of developed countries of the world. The ratio of disease and death (SRR) made up 0.27, less than world average index (SRR=0.35), which is also characteristic for developed countries. Besides, according to both indicators in dynamics, there was an increase in cancer incidence.
3. In Tbilisi, during a 13-year period (1998-2010) there were 12 913 registered cases of breast cancer.
4. According to SRR, compared to 1988-1992, in 1998-2002, the number of breast cancer rose by 3 times (SRR=3,1; 95% CI SRR =2,8-3,5) and in 2008-2010, compared to 1988-1992 – by 3.5 times (SRR=3,5; 95% CI SRR=3,1-4,0).
5. According to SIR, compared to 1988-1992, in 1998-2002, the number of breast cancer increased by 205% (SIR =305; 95% CI SIR=296,4-314,3) and in 2008-2010, compared to 1988-1992 – by 253% (SIR =353; 95% CI SIR=340,5-365,4).
6. According to Truncated Age-Standardized Rates ($TASR_{30-69}$), during a 13-year period (1998-2010), in age group: 30-69, 269.5 (95% CI=250,6-288.3) per 100 000 women got breast cancer each year. Cumulative Risk ($CR_{0-74}$) of breast cancer in Tbilisi female population made up 13.1%. Besides, according to these indicators in dynamics, there was an increase in the frequency of breast cancer incidence.
7. In 2002-2004, the deaths caused by malignant neoplasm of breast in Tbilisi female population ranked second after the diseases of circulatory system and its share in death structure was 18%.
8. According to systems, in the structure of death causes in Tbilisi female population, cancer of genitourinary system ranked first (56,9%000) and its share made up 50%.
9. 9. In 2002-2004, there were 845 registered cases of breast cancer-related deaths, in other words, every year, according to crude rates, 48 per 100 000 Tbilisi female citizens died of this cause, according to Age-Standardized Rates (World Standard) – 33, and according to Age-Adjusted Rates (Tbilisi Standard) - 43.
10. In the structure of deaths caused by cancer in women over 25, breast cancer ranks first. At the same time, at a later period, 35-59, breast cancer still ranks first in the structure of different causes of death. At 60 and more, breast cancer moves to the 2nd,4th, 5th, 9th and, at 80, to the 10th place.

**Recommendations:**

1. To control breast cancer, the first urgent task is to create population registry of cancer according to international requirements (IACR, Lyon; ENCR, Lyon) and to collect data about patients in follow-up regime, to renew electronic data bases, to hold descriptive analysis and epidemiological examination;
2. To increase the efficiency of screening programs and to reduce the number of breast cancer incidence in Tbilisi, it is recommended to carry out additional research, namely, to estimate the role and efficiency of ultrasonography of breast during the screening process.

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**Cervical Cancer Burden in Tbilisi**

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**Summary**

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 3,773 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 5,440 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.

***Abbreviations:*** *ASR- Age Standardized Rate, TASR- Truncated Age-Standardized Rates, SRR- Standardized Rate Ratio, SIR- Standardized Incidence Ratio, AAR- Age-Adjusted Rates, CR-Cumulative Risk.*

***Key words****: 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 counties. 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 Unites 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 level 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 females 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 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 counties. 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 in significantly in Poland and Czech Republic, remains the same is 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'Briena 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 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.

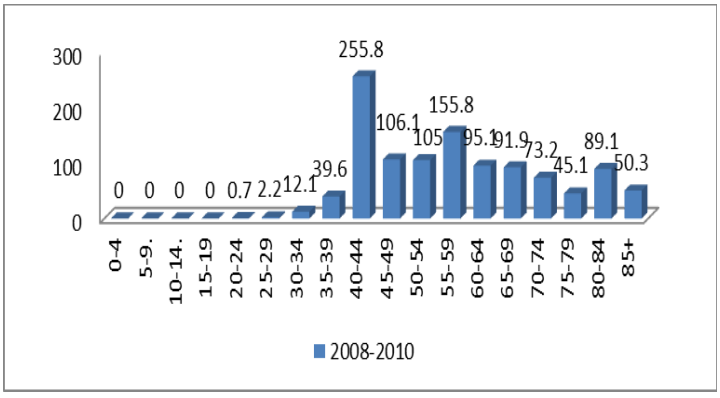
Descriptive indicators obtained in result of the survey and presented in the tables and charts were analyzed.

**Results of the research:**

**1. The burden of cervical cancer incidence 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 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.

37,0 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 (see Table 1).

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

| Period | ASR | SE | 95% CI ASR |
|---|---|---|---|
| 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 of cervical cancer incidence by Age Standardized Rates (ASR) from 29,9‰ (95% CI ASR, 28,2-31,6), up to 38,8‰ (95% CI ASR, 36,8-40,8) and 45,7‰ (95% CI ASR, 43,0-48,5) relatively.

According to the data provided by Tkeshelashvili V. (2007), relatively to dynamics of cervical cancer incidence by Age Standardized Rates (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 of cervical 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 Standardized Rates (ASR) of Cervical Cancer Incidence with 10 Years Intervals (1988-1992, 1998-2002, 2008-2010)

| Period | ASR | SE | 95% CI ASR |
|---|---|---|---|
| 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 |

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 2. Age Standardized Rates (ASR) of Cervical Cancer Incidence, with 10 Years Intervals (1988-1992, 1998-2002, 2008-2010)

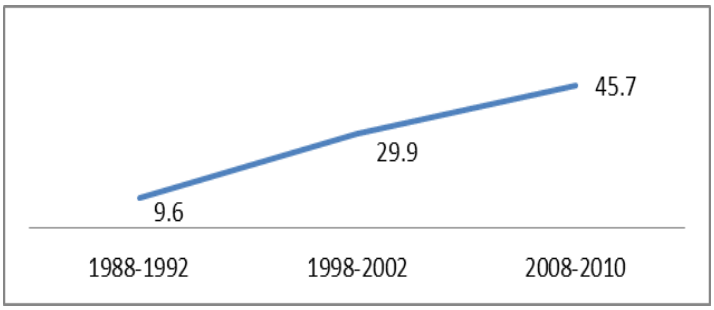
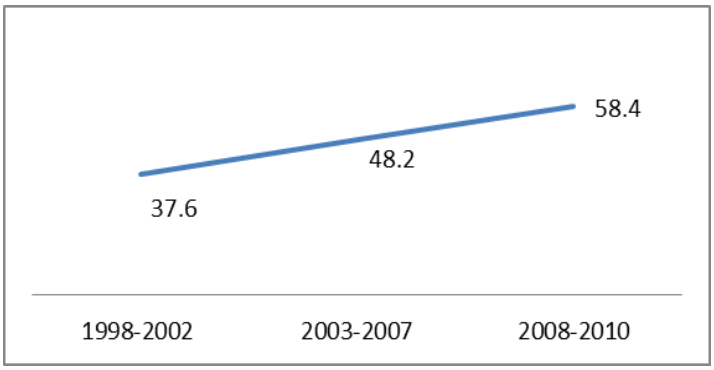



Chart 3. Dynamics of Cervical Cancer Incidence by Age-Adjusted Rates (AAR) (Tbilisi standard, 2002) per 100,000 females, during the period of 1998- 2010, in Tbilisi




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%000 relatively. (see: Chart 3).

Table 3. The Cumulative Risk ($CR_{0-74}$) of Cervical Cancer Incidence in Tbilisi during the period of 1998-2010

| Years | $CR_{0-74}$ | $SE_{Cum.Rate}$ | 95% $CICR_{0-74}$ |
|---|---|---|---|
| 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 ($CR_{0-74}$) of cervical cancer incidence in female population in Tbilisi for 13 years period (998-2010) 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 (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% CI SRR |
|---|---|---|---|
| 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).

According to Truncated Age-Standardized Rates (TASR) of cervical cancer incidence 69,0 females per 100,000 females (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).

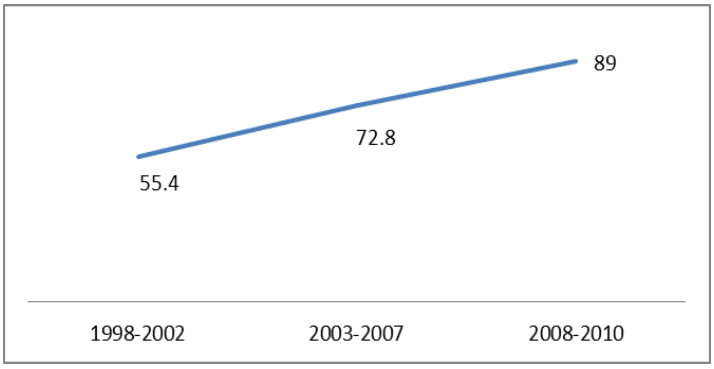
Table 6. Dynamics of Cervical Cancer Incidence in Tbilisi, in 1998-2010, by Truncated Age-Standardized Rates

| Years | $TASR_{25-64}$ | SE | 95% CI $TASR_{25-64}$ |
|---|---|---|---|
| 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 |

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 $TASR_{25-64}$=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).

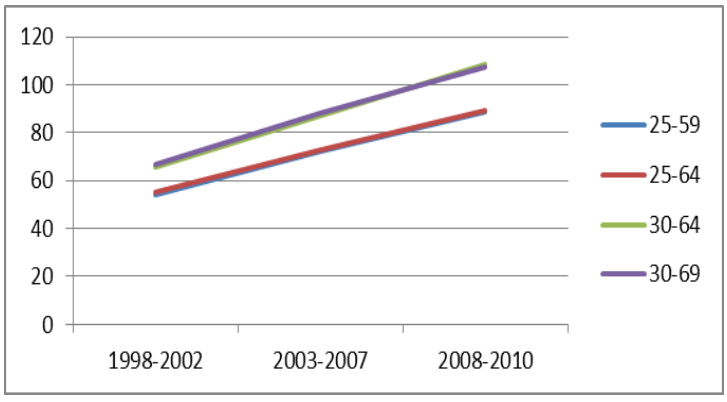
The increase of cervical cancer incidence in the age group 25-64 is clearly illustrated on a chart 4.

Chart 4. Dynamics of Cervical Cancer Incidence by Truncated Age-Standardized ($TASR_{25-64}$) Rates in Tbilisi, in 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.

Chart 5. Dynamics of) Cervical Cancer Incidence by Differentiated Truncated Age-Standardized (TASR) Rates in Tbilisi, during the period of 1998-2010



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

| # | Years | # | Com-parison of age groups | SRR | $\chi 2$ | 95% CI SRR |
|---|---|---|---|---|---|---|
| 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 Rations (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.

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

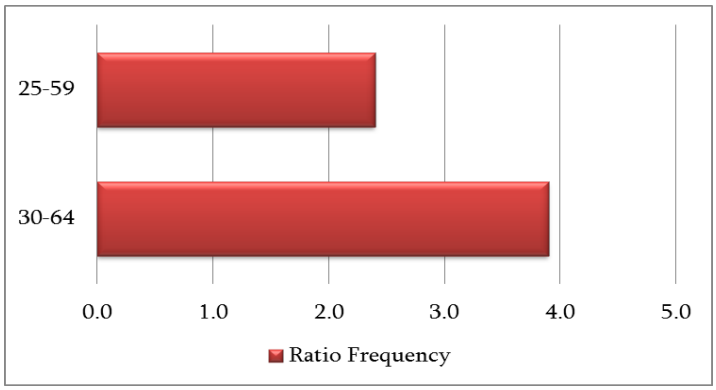
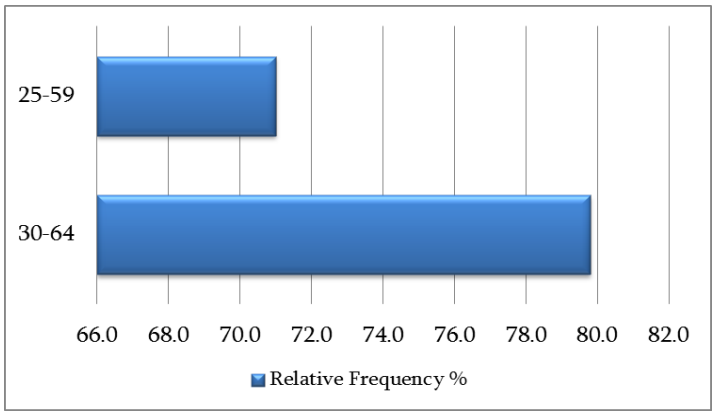



Chart 7. Relative Frequency of Cervical Cancer Incidence Age Specific Rates in 1998-2010 in Tbilisi




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 %.

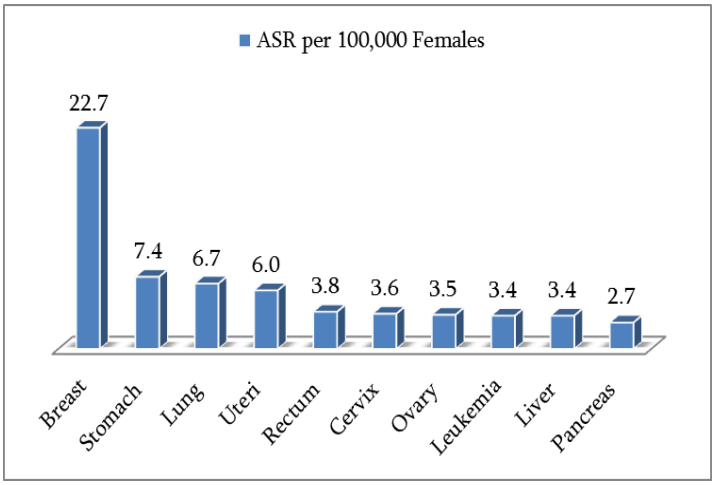
## 2. Structure of Cancer Related Mortality in Tbilisi Female Population

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 (see Table 8 and Chart 8).

Table 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) Calculation per 100,000 Females

| # | Cancer Site | ICD-10 | ASR | $SE_{ASR}$ | 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 |

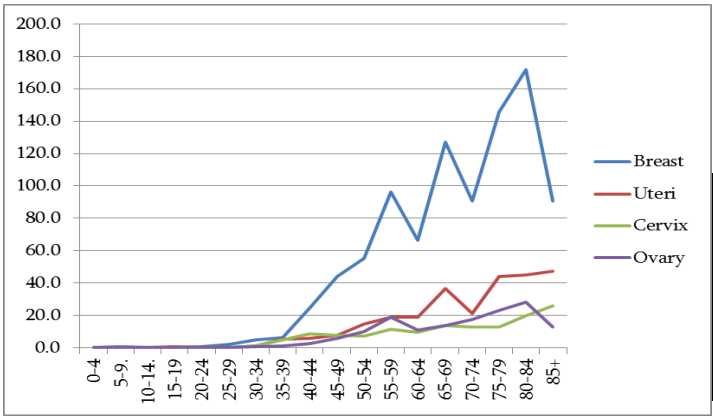
Chart 8. The Structure of Cancer Related Mortality (10 main sites) in female population in Tbilisi, during the period of 2003-2007. Age Standardized Rates (ASR) was calculated per 100,000 females




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 population 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 – 29,9 cases, cervical Cancer – 4,7 cases, Uterus cancer - 8,0 cases and Ovarian 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

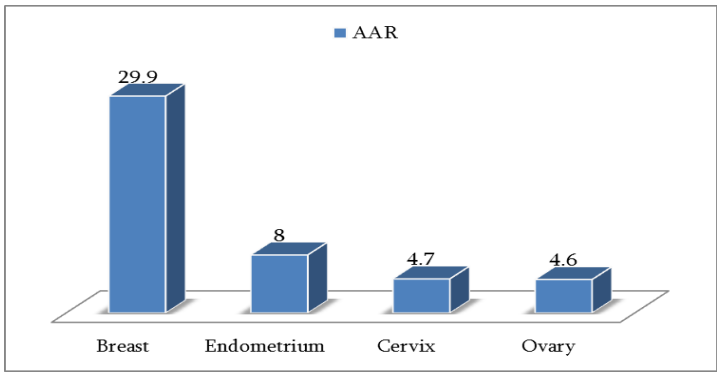



Table 9. The Cumulative Risk ($CR_{0-74}$) of Reproductive System Cancer Related Mortality in Female Population up to age 75, in Tbilisi, During the Period of 1998-2010

| Cancer site | $CR_{0-74}$ | $SE_{Cum.Rate}$ | 95% CI $CR_{0-74}$ |
|---|---|---|---|
| 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 ($CR_{0-74}$) 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).

Table 10. Truncated Standardized Rate Rations (TASR) of Cervical Cancer Related Mortality in Tbilisi, during the period of 1998-2010

| # | Truncated Age-Standardized Rates (TASR) Ratio | TSRR | $\chi 2$ | 95% CI SRR |
|---|---|---|---|---|
| 1 | $TASR_{30-64}$/ $TASR_{25-59}$ | 1,3 | 0,03 | 0,1-25,2 |
| 2 | $TASR_{30-69}$/ $TASR_{25-59}$ | 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.

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 Chart 11).

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

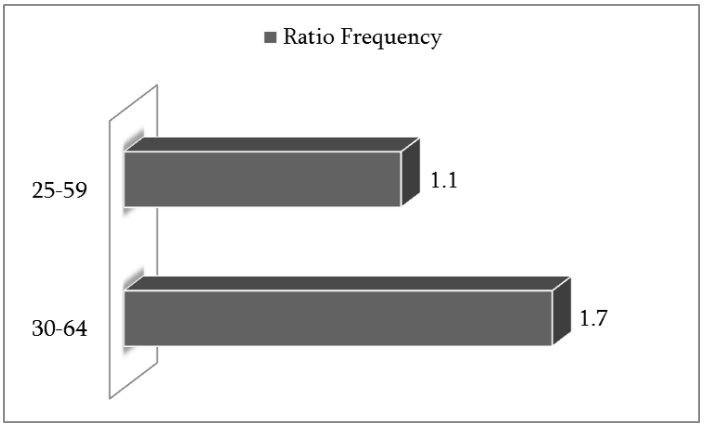
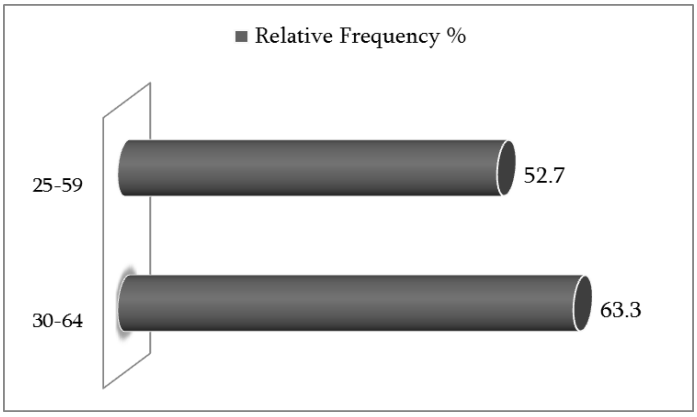



Chart 12. Relative Frequency of Age Specific Cervical Cancer Related Mortality in Tbilisi during the period of 2003-2007




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 Chart 12).

### 3. 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 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 tp 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 (998-2010) 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 ($TASR_{25-59}$) – Breast 28,2 (95% CI $TASR_{25-59}$=27,0-29,3), Cervix - 5,3 (95% CI $TASR_{25-59}$=4,8-5,8), Uterus- 6,7 (95% CI $TASR_{25-59}$=6,1-7,2), Ovary - 4,5 (95% CI $TASR_{25-59}$=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 mortally 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:**

1. The Burden of cervical cancer in female population in Tbilisi presents the important problem of medical and social character.
2. Cervical cancer incidence rate in Tbilisi (ASR=37,0‰000; AAR=46,5‰000; $CR_{0-74}$=3,9%) corresponds to the average rate of incidence in the world developing countries and mortality rate caused by this disease (ASR=3,6‰000; AAR=4,7‰000; $CR_{0-74}$=0,4%) corresponds to the same indicator of the developed countries.
3. 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.
4. 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%000) of incidence was registered in 2008-2010 in the age group of 40-44.
5. 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.
6. 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.
7. 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 %.

8. Cervical cancer was the sixth most common cause (ASR=3,6%000;AAR=4,7%000; $CR_{0-74}$=0,4%) of death in the structure of cancer related deaths with the ratio 2.9 % of all cases.
9. 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.
10. 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.
11. 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:**

1. 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.
2. To increase the effectiveness of the screening program and decrease the burden of cervical cancer in Tbilisi, the assumption basing 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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# The Efficiency of Breast Cancer Screening in Tbilisi

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**Summary**
We have analyzed 67,710 cases of screening-diagnostics conducted in 2010-2014 by National Screening Centre, in which 1,197 patients were diagnosed with breast cancer. The prevalence of breast cancer per 1,000 women was 17.7‰. The prevalence of breast cancer cases increases with age and reaches its peak in age group 65-69 (46.7‰). 53% of breast cancer cases were detected at I clinical stage, 35% - at the II, and 12% - at the III-IV clinical stages. With age, the detection of the disease at I stage decreases, while at the II clinical stage it increases. Breast cancer prevalence per 1,000 women (‰) at all clinical stages reaches its peak in age group 60-69. In order to evaluate the diagnostic efficiency of tests during breast cancer screening and estimate the diagnostic value and role of ultrasonography research, we studied the following indicators of diagnostic efficiency of breast physical examination, mammography, ultrasonography and punctate cytological research based on Screening National Centre. While evaluating diagnostic efficiency, we paid attention to the value of tests in differentiating diagnostics between breast cancer and other benign tumors. In order to evaluate the diagnostic efficiency and role of ultrasonography during breast cancer screening, we have additionally compared mammographic and ultrasonography results in cases of breast cancer and other benign tumors. During breast benign tumors, hyper diagnostics occurred in 39.2% of all cases according to mammographic research and only in 15.3% according to ultrasonography research. In other words, ultrasonography research in cases of benign tumors reduces the number of cases of screening hyper diagnostics by 23.9%. During breast cancer, hypo diagnostics occurred in 7.1% according to mammographic research and only in 2.7% according to ultrasonography research. In other words, ultrasonography research in cases of breast cancer reduces the number of cases of screening hypo diagnostics by 4.4% which is very important. It is very important that ultrasonography research at the age of 40-49 increases cases of early diagnostics of breast cancer in I clinical stage.

***Key words:*** *breast cancer, screening, the role and efficiency of ultrasonography, Tbilisi.*

**Problems Statement:**

In the 1980s, six European countries started breast screening programs. In England, Wales, Scotland and Holland, there is a tendency for reduction in breast cancer mortality, which is connected with diagnosing cancer at its early stage and adequate treatment by screening (Botha J.L. et al., 2003).

American College of Radiology (ACR) analyses (2008) the results of clinical research of Brown University, according to which adding ultrasonography to mammographic research during breast cancer screening increases the number of detected cases of cancer. At the same time, there is an increase in false positive indicators and, therefore, in the number of unnecessary biopsy.

According to Wax A. (2009), breast cancer ultrasonography can be conducted to identify the location of cancer in the breast, which will be used by doctors in biopsy and aspiration procedures.

Nothacker M. Et al (2009) analyzed the results of six cohort researches carried out in 2000-2008, in which both mammographic and ultrasonography research of breast was used in breast cancer screening. In case of negative results of mammographic screening, ultrasonography research of breast revealed the first invasive carcinoma in 0.32% of all cases. This was among the women who, according to American College of Radiology (ACR), were diagnosed with breast tumor of 2-4 type. The majority of cancer cases have been detected by ultrasonography. The potential negative side of ultrasonography for women is connected with the increase in frequency of biopsy.

American Cancer Society (2010) recommends the guidelines of breast cancer screening – annual mammography for early detection of breast cancer must be combined with ultrasonography. Ultrasonography research is particularly seen among women with high risk of breast cancer or during high density of breast tissue.

According to Teh W. and Wilson A.R. (1998), the members of European group of breast cancer screening believe that ultrasonography must be used during diagnostics and screening of breast cancer. The authors think that the role of ultrasonography is the following: breast ultrasonography, as the additional research of mammography and clinical research, makes important corrections in diagnosis, during both palpable and non-palpable breast pathology.

According to Steenhuysen J. (2008), women with high risk of breast cancer benefit from screening during which they get both mammographic and ultrasonography research more than those who only get mammographic screening. Among women with high risk of breast cancer, 50% of all existing breast cancer cases are detected by mammographic screening, while mammography and ultrasonography together detect 80% of existing cases of breast cancer.

According to Schwenk T.L (2008), mammographic screening decreases the frequency of breast cancer mortality by 15-20%. Ultrasonography research enables additional detection of the cases of breast cancer (12 cases of cancer researched by mammographic screening in 2600 women) whose diagnostics was not detected by mammographic screening, especially during dense breast tissue.

Kolb T.M. et al. (2002) compared sensitivity index of mammographic and ultrasonography research during heterogenic of high density of breast tissue. According to the authors, out of 105 cases of breast cancer, 60 (57%) were detected by mammography, while 101 (96%) – by ultrasonography.

By comparing mammographic and ultrasonography researches, some researchers priorities mammography for CIS, while during dense breast tissue and small, less than 1 cm, tumors – ultrasonography (Buchberger W. et al., 2000; Kolb T.M. et al., 2002).

Ultrasonography research is particularly effective in women under 50 with high density of breast tissue. In 42 cases of such cancer, mammography detected only 21 (50%) cases, while ultrasonography detected 33 (79%) cases. According to the authors, ultrasonography screening is more effective in young women irrespective of the density of breast tissue (Kolb T.M. et al., 2002).

In case of simultaneous use of mammography and ultrasonography in breast cancer screening, there is less risk of hypo diagnostics and the index is less than 2-4% (Moy L. Et al,. 2002).

Since 2008, there has been breast and cervix uteri cancer screening program in Tbilisi. So far, more than 80000 women have been researched by screening diagnostics.
At the same time, the efficiency of breast cancer screening, the role of ultrasonography and diagnostic value of the program have not been estimated by epidemiological research and there is no academic proof of optimization of advocacy of women's health.

**The aim of the research:**

To prevent cases of breast cancer by estimating the role of ultrasonography in breast cancer screening among Tbilisi female population, to present academic proof of optimization of advocacy of women's health.

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

In the scientific research we used the materials of the screening program and the information we received as a result of their realization. In order to estimate the current screening program epidemiologically, the research intends to solve the following task:

- ◊ evaluation of diagnostic efficiency and the role of ultrasonography in breast cancer screening program in Tbilisi (2010-2014).

**Target groups and methodology of research:**

In 2010-2014, in Tbilisi, 80 585 women were examined within the screening program of breast cancer. In 2010-2014, 84% of mammographic screening cases were conducted in Screening National Centre. As a result of screening diagnostics, in a five-year period, 1 197 patients out of 67 710 were diagnosed with breast cancer.

In order to evaluate the diagnostic efficiency of tests during breast cancer screening and estimate the diagnostic value and role of ultrasonography research, we studied the following indicators of diagnostic efficiency of breast physical examination, mammography, ultrasonography and punctate cytological research based on Screening National Centre: sensitivity, specificity, positive and negative predictive values and efficiency of tests. While evaluating diagnostic efficiency of tests, the result of each research was compared to the final clinical diagnosis of every individual patient based on complex research.

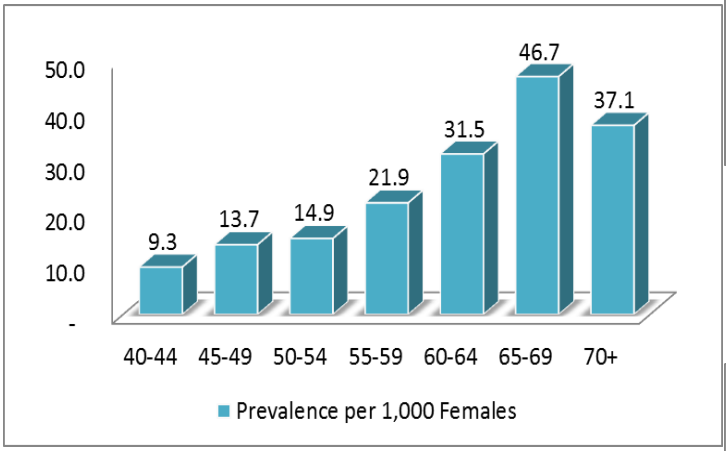
**Results of the research:**

In the period of 2010-2014, it was performed breast cancer screening in the Screening National Centre. Was investigated and analyzed 67,710 females, which was 84% of total research sample population (see Table 1).

Table 1. The number of researched women and detected cases of breast cancer during breast cancer screening in Tbilisi in 2010-2014 and the prevalence of breast cancer per 1000 women according to age

| Age group | Total number of researched women | The number of detected breast cancer cases | The prevalence of breast cancer per 1000 researched women |
|---|---|---|---|
| 40-44 | 16391 | 153 | 9.3 |
| 45-49 | 15880 | 218 | 13.7 |
| 50-54 | 14692 | 219 | 14.9 |
| 55-59 | 10401 | 228 | 21.9 |
| 60-64 | 6636 | 209 | 31.5 |
| 65-69 | 3360 | 157 | 46.7 |
| 70+ | 350 | 13 | 37.1 |
| Total | 67,710 | 1,197 | 17.7 |

Drawing 1. The prevalence of breast cancer according to age group per 1000 researched women at Tbilisi Screening Centre in 2010-2014




As a result of screening diagnostics, within a five-year period, 1,197 patients out of 67,710 were diagnosed with breast cancer. The prevalence of breast cancer is 17.7‰ per 1,000 women.

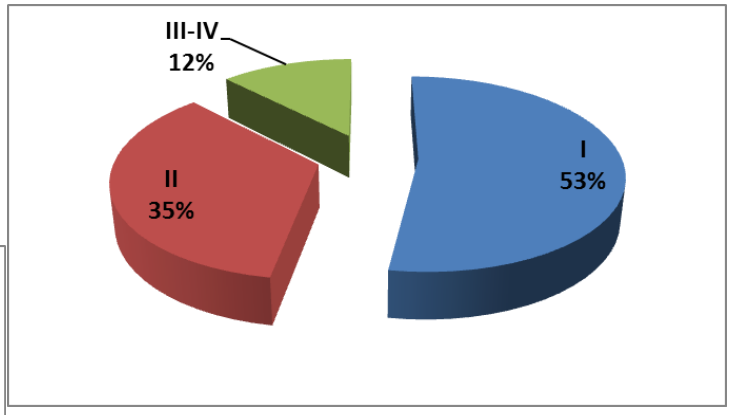
The prevalence of breast cancer per 1000 women according to age group is shown in Drawing 1. The prevalence of breast cancer cases is increasing with age and reaches its peak in age group 65-69 (46.7‰).

Table 2. The number of detected breast cancer cases according to age group and research years conducted in 2010-2014 by Screening National Centre in Tbilisi

| Age group | 2010 | 2011 | 2012 | 2013 | 2014 | 2010-2014 |
|---|---|---|---|---|---|---|
| 40-44 | 23 | 13 | 41 | 41 | 35 | 153 |
| 45-49 | 34 | 36 | 53 | 59 | 36 | 218 |
| 50-54 | 39 | 22 | 46 | 60 | 52 | 219 |
| 55-59 | 41 | 22 | 58 | 51 | 56 | 228 |
| 60-64 | 24 | 34 | 47 | 59 | 45 | 209 |
| 65-69 | 28 | 13 | 35 | 41 | 40 | 157 |
| 70+ | 10 | 1 | 2 | 0 | 0 | 13 |
| Total | 199 | 141 | 282 | 311 | 264 | 1,197 |

The number of detected breast cancer cases in Tbilisi according to age group and research years conducted in 2010-2014 by Screening National Centre is shown in Table 2, while the number of detected breast cancer cases according to age groups and clinical stages are shown in Table 3.

Drawing 2. Rates of clinical stages of breast cancer provided by the Screening National Centre in Tbilisi in 2010-2014.




Drawing 3. The number of detected breast cancer cases according to age groups and clinical stages conducted in 2010-2014 by Screening National Centre in Tbilisi

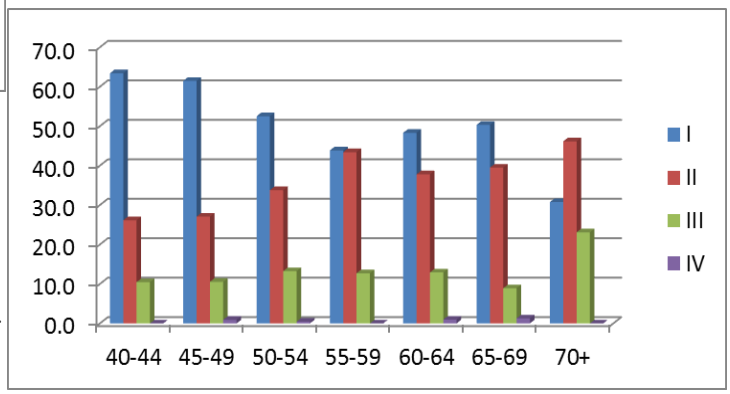


Table 3. The number of detected breast cancer cases according to age groups and clinical stages conducted in 2010-2014 by Screening National Centre in Tbilisi

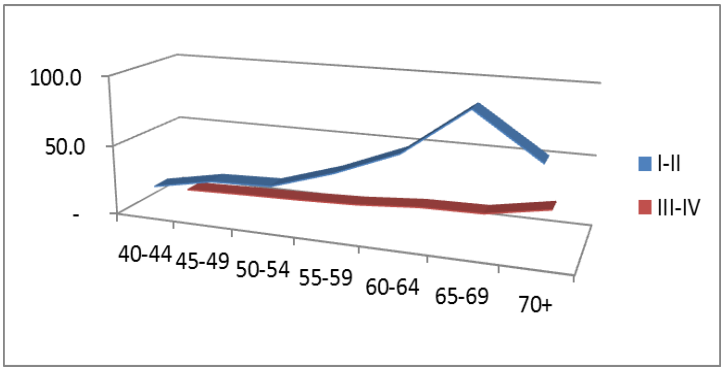
| Age group | Total number of detected cases of breast cancer | Stage | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | I | | II | | III | | IV | |
| | | Abs. number | % | Abs. number | % | Abs. number | % | Abs. number | % |
| 40-44 | 153 | 97 | 63.4 | 40 | 26.1 | 16 | 10.5 | 0 | 0.0 |
| 45-49 | 218 | 134 | 61.5 | 59 | 27.1 | 23 | 10.6 | 2 | 0.9 |
| 50-54 | 219 | 115 | 52.5 | 74 | 33.8 | 29 | 13.2 | 1 | 0.5 |
| 55-59 | 228 | 100 | 43.9 | 99 | 43.4 | 29 | 12.7 | 0 | 0.0 |
| 60-64 | 209 | 101 | 48.3 | 79 | 37.8 | 27 | 12.9 | 2 | 1.0 |
| 65-69 | 157 | 79 | 50.3 | 62 | 39.5 | 14 | 8.9 | 2 | 1.3 |
| 70+ | 13 | 4 | 30.8 | 6 | 46.2 | 3 | 23.1 | 0 | 0.0 |
| Total | 1,197 | 630 | 52.6 | 419 | 35.0 | 141 | 11.8 | 7 | 0.6 |

53% of 1,197 cases of breast cancer were detected in the I clinical stage, 35% -in the II stage and 12% - in the III clinical stage. With age, there are less cases of detecting the disease in the I stage and more cases of the disease in the II clinical stage. The prevalence of breast cancer in all clinical stages reaches its peak at the age of 60-69 (see Drawing 2, 3 and 4).

Table 4. The prevalence of breast cancer according to clinical stages and age per 1000 women researched in 2010-2014 at Screening National Centre in Tbilisi

| Age group | Clinical Stage | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| 40-44 | 13.2 | 5.5 | 2.2 | - |
| 45-49 | 18.9 | 8.3 | 3.2 | 0.3 |
| 50-54 | 17.5 | 11.3 | 4.4 | 0.2 |
| 55-59 | 21.5 | 21.3 | 6.2 | - |
| 60-64 | 34.0 | 26.6 | 9.1 | 0.7 |
| 65-69 | 52.5 | 41.2 | 9.3 | 1.3 |
| 70+ | 25.3 | 38.0 | 19.0 | - |

Drawing 4. The prevalence of breast cancer according to stages and age per 1,000 women researched in 2010-2014 at Screening National Centre

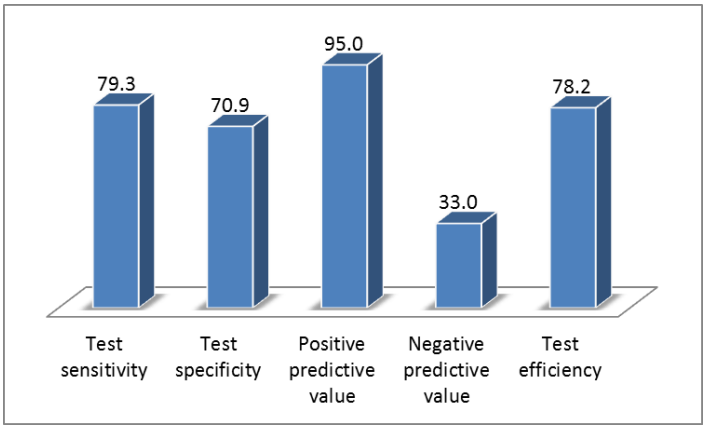



While evaluating the efficiency of diagnostics, the emphasis was put on the values of tests in the process of differentiating between breast cancer and benign tumors.

Table 5. The comparison of the results of clinical diagnosis and breast physical examination conducted in 2010-2014 at the Screening National Centre during differentiating diagnostics between breast cancer and benign tumors

| Breast physical examination | Clinical diagnosis | | | | |
|---|---|---|---|---|---|
| | Breast cancer | | Breast benign tumor | | |
| | Total number | % | Total number | % | Total |
| Breast cancer | 949 | 95.0 | 50 | 5.0 | 999 |
| Breast benign tumor | 248 | 67.0 | 122 | 33.0 | 370 |
| Total | 1,197 | 87.4 | 172 | 12.6 | 1,369 |
| $\chi^2$= 192,0; p<0,001 | | | | | |

Drawing 5. Evaluation of the efficiency of differentiating diagnostics between the cases of breast cancer and benign tumors conducted in the Screening National Centre in 2010-2014




The comparison of the results of clinical diagnosis and breast physical examination during differentiation diagnostics between breast cancer and benign tumors is shown in Table 6.

| Mammography | Clinical diagnosis | | | | |
|---|---|---|---|---|---|
| | Breast cancer | | Breast benign tumor | | Total |
| | Abs. number | % | Abs. number | % | |
| Breast cancer | 572 | 90.4 | 61 | 9.6 | 633 |
| Breast benign tumor | 618 | 84.9 | 110 | 15.1 | 728 |
| Total | 1,190 | 87.4 | 171 | 12.6 | 1,361 |
| $\chi^2$=9,2 ; p=0,002 | | | | | |

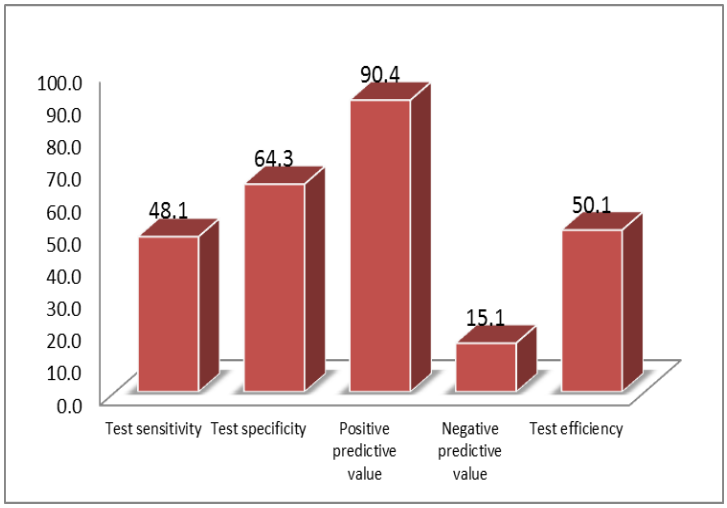
According to the research conducted at Screening National Centre in 2010-2014, out of 1 369 women, 1,197 (87.4%) patients were diagnosed with breast cancer, while 172 (12.6%) – with benign tumors. Clinical diagnosis of breast cancer in 949 (95%) and breast benign tumors in 122 (33%) cases were also made by breast physical examination.

The ratio of diagnostic efficiency of breast physical examination in differentiating diagnostics is shown in Drawing 5. The sensitivity of breast physical examination is 79.3%, its specificity – 70.9%, the ration of predicting positive results of tests – 95.0%, the ration of predicting negative results of tests – 33.0% and ratio of test values - 78.2%.
Table 6. The comparison of the results of clinical diagnosis and breast physical examination conducted in 2010-2014 at the Screening National Centre during differentiating diagnostics between breast cancer and benign tumors

The comparison of the results of clinical diagnosis and breast physical examination to differentiate between breast cancer and benign tumors is shown in Table 6. 1,190 (87.4%) out of 1,361 women researched at the Screening National Centre in 2010-2014 were diagnosed with breast cancer, and 171 (12.6%) – with benign breast tumor. Clinical diagnosis of 572 (90.4%) cases of breast cancer and 110 (15.1%) cases of benign breast tumor was also confirmed by mammography.

The efficiency of mammography diagnostics in differentiating diagnostics is shown in Drawing 6. Mammography sensitivity ratio was 48.1%, specificity ratio – 64.3%, ratio of predicting positive results – 90.4%, ratio of predicting negative results – 15.1%, and ratio of values – 50.1%.

Drawing 6. Evaluation of mammographic efficiency in differentiating diagnostics between the cases of breast cancer and benign tumors carried out in the Screening National Centre in 2010-2014




The comparison of clinical diagnosis with the results of ultrasonography in differentiating diagnostics between the cases of breast cancer and benign tumors is presented in Table 7.

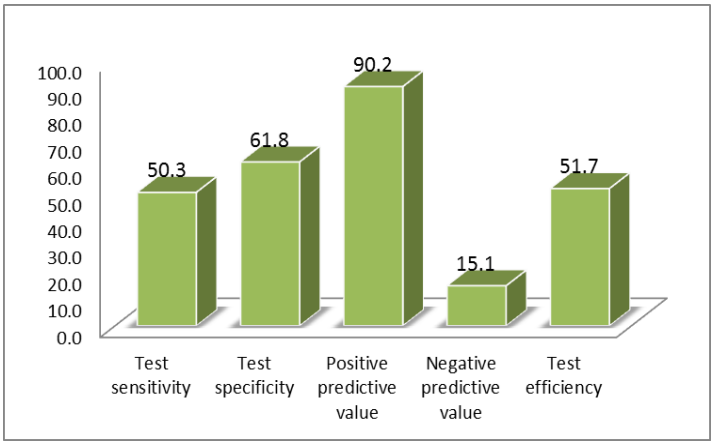
1,191 (87.5%) out of 1,361 women researched at the Screening National Centre in 2010-2014 were diagnosed with breast cancer, and 170 (12.5%) – with benign breast tumor. Clinical diagnosis of 599 (90.2%) cases of breast cancer and 105 (15.1%) cases of benign breast tumor was also confirmed by ultrasonography.

Table 7. The comparison of clinical diagnosis with the results of ultrasonography in differentiating process between the cases of breast cancer and benign tumors carried out at the Screening National Centre in 2010-2014

| Ultrasonography | Clinical diagnosis | | | | |
|---|---|---|---|---|---|
| | Breast cancer | | Benign breast tumor | | Total |
| | Abs. number | % | Abs. number | % | |
| Breast cancer | 599 | 90.2 | 65 | 9.8 | 664 |
| Benign breast tumour | 592 | 84.9 | 105 | 15.1 | 697 |
| Total | 1,191 | 87.5 | 170 | 12.5 | 1,361 |
| $\chi^2$=8,7 ; p=0,003 | | | | | |

Efficiency ratio of ultrasonography in differentiating diagnostics is shown in Drawing 7. Ultrasonography sensitivity ratio was 50.3%, specificity ratio – 61.8%, ratio of predicting positive results – 90.2%, ratio of predicting negative results – 15.1%, and ratio of values – 51.7%.

Drawing 7. Evaluation of ultrasonography efficiency in differentiating diagnostics between the cases of breast cancer and benign tumors in the Screening National Centre in 2010-2014




The comparison of the results of punctate cytological and biopsy histology researches in differentiating diagnostics between the cases of breast cancer and benign tumors is presented in Table 8.

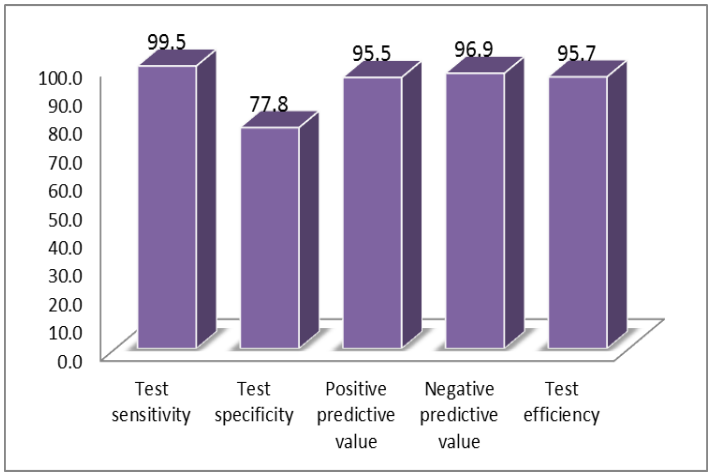
Table 8. The comparison of the histological conclusions and the results of punctate cytological research in differentiating diagnostics between the cases of breast cancer and benign tumors carried out in the Screening National Centre in 2010-2014

| Cytological research | Histological diagnosis | | | | |
|---|---|---|---|---|---|
| | Breast cancer | | Benign breast tumor | | Total |
| | Abs. number | % | Abs. number | % | |
| Breast cancer | 379 | 95.5 | 18 | 4.5 | 397 |
| Benign breast tumour | 2 | 3.1 | 63 | 96.9 | 65 |
| Total | 381 | 82.5 | 81 | 17.5 | 462 |
| $\chi^2$=330,0; p<0,001 | | | | | |

381 (82.5%) out of 462 women researched at the Screening National Centre in 2010-2014 were diagnosed with breast cancer according to histological examination, and 81 (17.5%) – with benign breast tumor. The diagnosis of 379 (95.5%) cases of breast cancer and 63 (96.9%) cases of benign breast tumor was also confirmed by cytology.

The ratio of diagnostic efficiency of cytological research in differentiating diagnostics is presented in Drawing 8. Cytological sensitivity ratio was 99.5%, specificity ratio – 77.8%, ratio of predicting positive results – 95.5%, ratio of predicting negative results – 96.9%, and ratio of values – 95.7%.

Drawing 8. Evaluation of the efficiency of punctate cytological research in differentiating diagnostics between the cases of breast cancer and benign tumors carried out in the Screening National Centre in 2010-2014



In order to evaluate the value and role of ultrasonography diagnostics during screening diagnostics of breast cancer, we have additionally compared the results of mammography and ultrasonography in the cases of benign tumors and breast cancer (see Tables 9, 10 and Drawings 9, 10).

Table 9. The comparison of the results of mammography and ultrasonography in detecting the cases of benign breast tumors at the Screening National Centre in 2010-2014

| Mammography (BIRADS) | Ultrasonography | | | | Total |
|---|---|---|---|---|---|
| | 2, 3 | | 4, 5 | | |
| | Abs. number | % | Abs. number | % | |
| 2, 3 | 171 | 84,7 | **31** | 15,3 | 202 |
| 4, 5 | **47** | 39,2 | 73 | 60,8 | 120 |
| $\chi^2$= 71,2; p<0,001 | | | | | |

During breast benign tumors hyper diagnostics occurred in 39.2% of all cases according to mammographic research and only in 15.3% according to ultrasonography research. In other words, ultrasonography research in cases of benign tumors reduces the number of cases of screening hyper diagnostics by 23.9% ($\chi^2$= 71,2; p<0,001).

Drawing 9. Comparison of results of mammography and ultrasonography during benign tumors detected at the Screening National Centre in 2010-2014

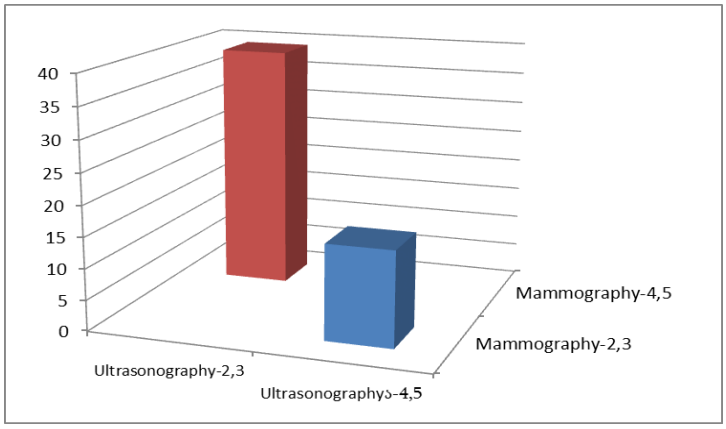
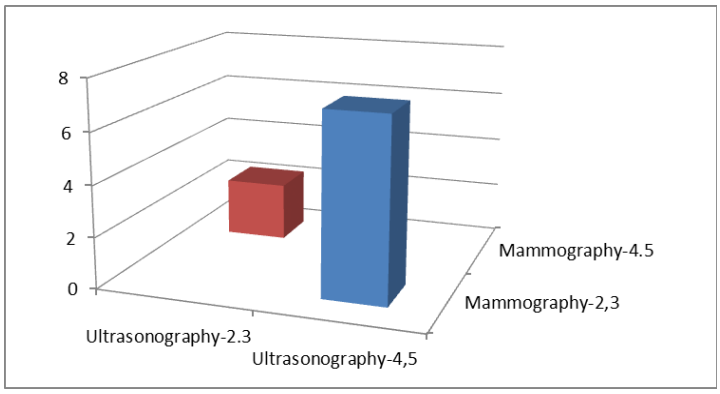



Table 10. Comparison of results of mammography and ultrasonography during breast cancer detected at the Screening National Centre in 2010-2014

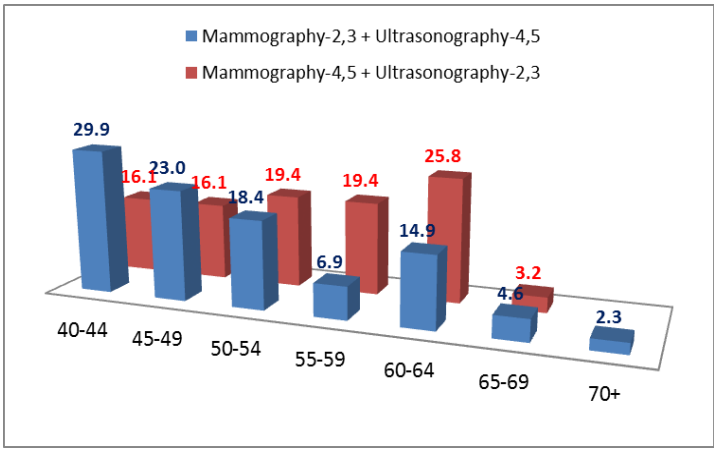
| Mammography (BIRADS) | Ultrasonography | | | | Total |
|---|---|---|---|---|---|
| | 2, 3 | | 4, 5 | | |
| | Total number | % | Total number | % | |
| 2, 3 | 1,136 | 92,9 | **87** | 7,1 | 1,223 |
| 4, 5 | **31** | 2,7 | 1,116 | 97,3 | 1,147 |
| $\chi^2$= 1930,0; p<0,001 | | | | | |

Drawing 10. Comparison of results of mammography and ultrasonography during breast cancer detected at the Screening National Centre in 2010-2014

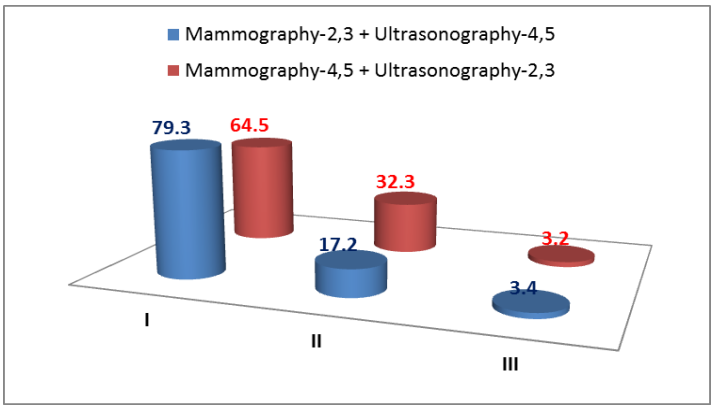



During breast cancer, mammographic research detected hypo diagnostics in 7.1% of all cases and only 2.7% of cases were detected by ultrasonography research. In other words, ultrasonography research in cases of breast cancer reduces the number of cases of screening hypo diagnostics by 4.4% ($\chi^2$= 1930,0; p<0,001).

Drawing 11. Comparison of results of mammography and ultrasonography in detecting breast cancer according to patients' age, carried out at the Screening National Centre in 2010-2014




Drawing 12. Comparison of results of mammography and ultrasonography in detecting breast cancer according to the stages of clinical disease, carried out at the Screening National Centre in 2010-2014



It should be noted that the ultrasonography research in age group 40-49 increases the number of early detection of breast cancer at the I clinical stage (see Drawings 11 and 12).

**Conclusions:**

1. We have analyzed 67 710 cases of screening-diagnostics conducted in 2010-2014 by National Screening Centre, in which 1 197 patients were diagnosed with breast cancer. The prevalence of breast cancer per 1000 women was 17.7%. The prevalence of breast cancer cases increases with age and reaches its peak in age group 65-69 (46.7%).
2. 53% of 1 197 cases of breast cancer were detected in the I clinical stage, 35% -in the II stage and 12% - in the III-IV clinical stages. With age, there are less cases of detecting the disease in the I stage and more cases of the disease in the II clinical stage. The prevalence of breast cancer in all clinical stages reaches its peak at the age of 60-69.
3. In differentiating diagnostics between breast cancer and benign tumors, the ratio of ultrasonography sensitivity was 50.3%, specificity ratio – 61.8%, ratio of predicting positive results – 90.2%, ratio of predicting negative results – 15.1%, and ratio of values – 51.7%.
4. During breast benign tumors, mammographic research detected hyper diagnostics in 39.2% of all cases and only 15.3% were detected by ultrasonography research. In other words, ultrasonography research in cases of benign tumors reduces the number of cases of screening hyper diagnostics by 23.9% ($\chi^2$= 71,2; p<0,001).
5. During breast cancer, mammographic research detected hypo diagnostics in 7.1% of all cases and only 2.7% were detected by ultrasonography research. In other words, ultrasonography research in cases of breast cancer reduces the number of cases of screening hypo diagnostics by 4.4% ($\chi^2$= 1930,0; p<0,001).
6. Carrying out both mammographic and ultrasonography research at the age of 40-49 increases cases of early diagnostics of breast cancer in I clinical stage.
7. During breast cancer screening, diagnostic efficiency of ultrasonography research is high and its role is important in early diagnostics of cancer during dense breast tissue, in women aged 40-49, during differentiating diagnostics between breast cancer and benign tumors, during small tumors to make morphological research of punctate and biopsy.

**Recommendations:**

1. To increase the effectiveness of early detection of breast cancer and screening program, to decrease the number of cancer burden and hypo diagnostic cases, it is recommended to use both mammography screening and ultrasonography research in the following situations:
   - ◊ High density of breast tissue
   - ◊ Among women aged 40-49
   - ◊ During differentiating diagnostics between breast cancer and benign tumors
   - ◊ During small tumors to make morphological research of punctate and biopsy.
2. Epidemiological evaluation of the role of ultrasonography research, academic explanation of the advocacy of women's health and education of female population – teaching them self-examination of breasts and working out the habit of regular screening, will help optimize preventive management of breast cancer, and the implementation of the acquired recommendations into practice will create scientifically proved basis for the social and economic progress.

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**Assessment of the Effectiveness of Cervical Cancer Screening in Tbilisi**

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**Summary**

According to the US Center for Disease Control (CDC 2013), a reliable statistical tendency of decreasing cervical cancer incidence and mortality caused by this disease has been recorded in the United States over the recent 40 years that relates to high rate coverage of a female population by Pap test screening. This tendency is proved by American Cancer Society (ACS, 2012). According to Gold M.A. (2006), 70-80 % decrease of cervical cancer incidence has been achieved by Pap test screening in developed countries. According to the Norwegian Cervical Cancer Screening Program (NCCSP, 2014), screening has contributed to 25 % decrease of cervical cancer incidence and 50 % decrease of mortality caused by this disease in Norway. According to Nanda K. et al. (2000) data, in case of cervical cancer CIN 2/3, Pap test sensitivity and specificity vary within the range 47 % - 62 % and 60% - 85% correspondingly. We have studied the cost-effectiveness of cervical cancer screening program, based on 5 year period data (2010–2014): 66,324 women received gynecological examination and Pap test and 12,147 received colposcopy, targeted biopsy and morphological analysis. In 2013, 13,584 women received cervical cancer screening, among them 7,416 women at the National Screening Center (NCC). The indicators of diagnostic effectiveness of gynecological examination, Pap test, colposcopy and combination of a Pap test and colposcopy have been studied based on NCC data with a purpose of assessment. In 2013, the prevalence of severe cervical dysplasia (CIN3) and intraepithelial carcinoma (CIS) per 1,000 female population eligible for screening constituted 9,8 % and cancer prevalence was 6,1 %. The study has found that making of alterations in a screening guideline and re-adjusting of a target group from 25-59 to 30-64 age group will increase the number of detected cervical cancer cases and decrease needed expenditures: in case of 50 % coverage of a target group by ~93,000 GEL and by ~130,000 GEL in case of 70 % coverage. i.e. making of alterations to the screening guideline and re-adjusting of a target group to 30-64 age group will significantly enhance the cost-effectiveness of cervical cancer screening.

***Abbreviations:*** *CIS-Carcinoma in Situ, CIN-Cervical Intra-epithelial Neoplasia*

***Key words:*** *cervical cancer, screening, cost-effectiveness, Tbilisi.*

**Problems Statement:**

According to the US Center for Disease Control (CDC 2013), a reliable statistical tendency of decreasing cervical cancer incidence and mortality caused by this disease has been recorded in the United States over the recent 40 years that relates to high rate coverage of a female population by Pap test screening.

Decreasing tendency of mortality caused by cervical cancer and its relation to Pap test screening of the female population is also proved by American Cancer Society (ACS, 2012).

According to Willoughby B.J. et al. (2006) data, cervical cancer incidence and mortality caused by this disease in the world developed countries has decreased by 75 % in recent 50 years.

According to the Lofters A.K. et al. (2011) data, in Ontario, the coverage rate of cervical cancer screening of the female population in the target age group 20 -69 is 85 %.

It should be noted, that different guidelines of cervical cancer screening are used in different countries. e.g. 2 guidelines (USPSTF, 2012; Saslow D. et al., 2011), recommended by USPSTF and ACS/ASCCP/ASCP have been used for screening in the United States in 2012.

According to Sasieni P. et al. (2009) data, all women in 25-64 age group receive screening at 3-5 year period. During the last 20 years, cervical cancer incidence has decreased by half. e.g. 1988, when cervical cancer screening program was launched, 4,132 women were diagnosed with cervical cancer, i.e. Relative to Age Standardized Rates (ASR) 16,2 women per 100,000 of female population were affected by this disease that year. To compare, in 2008 only 2,369 cases of this localization cancer was revealed, i.e. 8,3 women per 100,000 of female population were affected by the disease in 2008.

According to Gold M.A. (2006), cervical Pap testing applied in screening program in many countries, makes it possible to identify the patients with pre-cervical cancer diseases, provide treatment and follow-up observation. In world developed countries, Pap test screening has resulted in 70-80 % decrease of cervical cancer incidence.

According to Nanda K. et al. (2000) data, the Pap test sensitivity range within 47%-62 % and specificity within 60%-85 %.

According to the Cancer Registry of Finland (2014), effective functioning of cervical cancer screening program resulted in a 80 % decrease in cervical cancer incidence and mortality caused by this disease.

Dickinson J.A. et al. (2012) has released the data of the Canadian Cancer Registry, stating that mortality caused by cervical cancer per 100,000 female population during the period from 1952 to 2006, has decreased from 13,5 up to 2,2. Due to the screening program, cervical cancer incidence In Canada was reduced by 58% and mortality caused by this disease by 71% during the period of 1972-2006.

Basing on the results of own study, Goldie S.J. et al. (2001) recommends that annual cytological screening for HIV infected patients instead of 3-5 year interval is the cost-effective modification of existing guideline.

According to Andrae B. et al. (2012) data, women that regularly participate in the cervical screening program, has a low risk of mortality caused by this disease due to early detection of a disease.

According to the Norwegian cervical cancer screening program (NCCSP, 2014), screening has contributed to 25 % decrease of cervical cancer incidence and 50 % decrease of mortality caused by this disease.

In 2008, breast and cervical cancer screening program has been launched in Georgia. To date, more than 80,000 women received screening diagnostic examination. At the same time, there is no epidemiological study conducted for the assessment of the cost-effectiveness of a screening program, a diagnostic value of tests used while screening and until now, there is no academic proof for optimization of female health advocacy.

**Goals and objectives of the study:**

Screening program materials and the data collected as a result of its realization have been used in a scientific study. Designed for epidemiological assessment of a current screening program, it was directed at solving of a below provided objective:

- ◊ Carry out the epidemiological assessment of a diagnostic value of cervical cancer screening tests and cost -effectiveness of the program in Tbilisi.

***Study Target Groups and Methodology:***

81,973 women have been examined within the framework of cervical cancer screening program during the period of 2008-2014. Cervical Cancer screening diagnostic guideline implied the following tests: gynecological examination (PV et PR) and Pap test; colposcopy, biopsy and histology were provided if needed.

Screening program cost-effectiveness was studied based on a data of the 5 year period (2010 -2014): gynecological examination and Pap test was provided to 66,324 women and 12,147 women received colposcopy, biopsy and histological analysis. In 2013, cervical cancer screening was provided in total to 13,584 women, among them 7,416 (54,6%) women were examined at the National Screening Center. Thus, the assessment of cervical cancer screening effectiveness based on the data of the National Screening Center was considered quite valid.

To assess the diagnostic value of cervical cancer screening basing on a data of the National Screening Center, following indicators of gynecological examination, Pap tests, colposcopy and combination of Pap test and colposcopy have been studied: sensitivity, specificity, positive and negative predictive values and efficiency of tests.

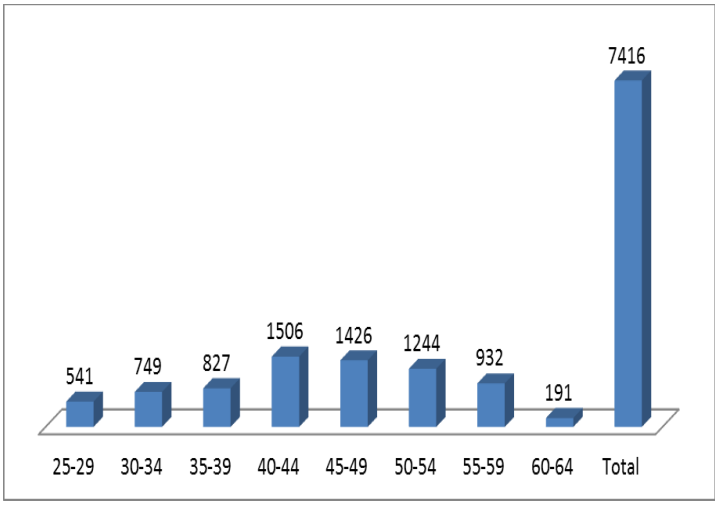
While assessing the diagnostic value of the test, each examination result was compared with a clinical diagnosis, made on a basis of complex examination in case of each individual patient.

**Results of the research:**

Statistical indicators collected as a result of a study have been analyzed and presented in tables and charts.

The data of the National Screening Center since 2013 (See Chart # 1) has been analyzed for the assessment of cervical cancer screening test effectiveness in Tbilisi.

Chart 1. Age distribution of women were examined at the National Screening Center in 2013




In 2013, cervical cancer screening was provided in total to 13,584 women, among them 7,416 (54,6%) women were examined at the National Screening Center. Thus, the assessment of cervical cancer screening effectiveness based on the data of the National Screening Center was considered quite valid.

Screening-diagnostic results of women examined at the National Screening Center in 2013 according the age groups are provided in a table 1.

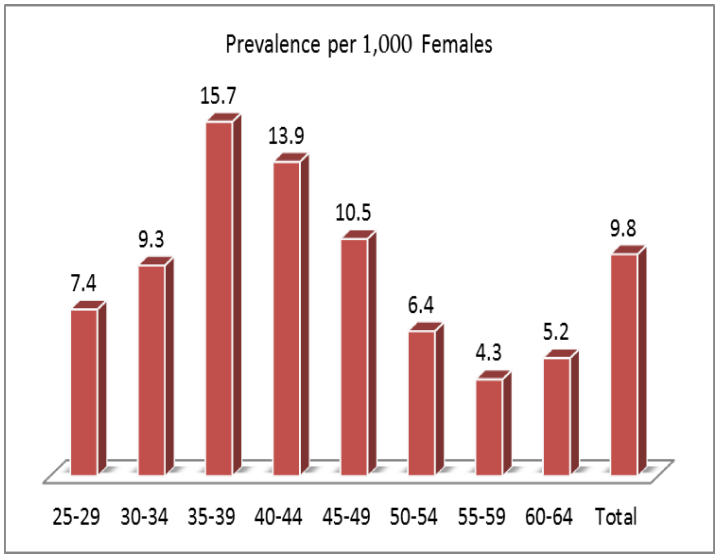
Table 1. Screening-diagnostic results of women examined at the National Screening Center in 2013 according the age groups

| Age | Absolute quantity | Clinical Diagnose | | | |
|---|---|---|---|---|---|
| | | Standard | Atypia, mild and moderate dysplasia (CIN 1, CIN2) | Pre-Cancer diseases (severe dysplasia -CIN3 and CIS) | Cancer |
| 25-29 | 541 | 509 | 27 | 4 | 1 |
| 30-34 | 749 | 686 | 54 | 7 | 2 |
| 35-39 | 827 | 745 | 61 | 13 | 8 |
| 40-44 | 1506 | 1383 | 93 | 21 | 9 |
| 45-49 | 1426 | 1325 | 75 | 15 | 11 |
| 50-54 | 1244 | 1189 | 43 | 8 | 4 |
| 55-59 | 932 | 886 | 34 | 4 | 8 |
| 60-64 | 191 | 181 | 7 | 1 | 2 |
| Total | 7,416 | 6,904 | 394 | 73 | 45 |

45 cases of cervical cancer and 73 cases of severe cervical dysplasia (CIN3) and intraepithelial carcinoma (CIS) have been detected among 7,416 women, examined at the National Screening Center in 2013.

The prevalence of severe cervical dysplasia (CIN3) and intraepithelial carcinoma (CIS) per 1,000 the women eligible for screening equaled to 9,8%0 in 2013. High level of severe cervical dysplasia and (CIN3) and intraepithelial carcinoma (CIS) was noted in 35-49 age group (See Chart 2).

Chart 2. The prevalence of pre-cancer diseases (CIN3/CIS) per 1,000 (%0) of screening eligible women in Tbilisi, in 2013, according the age groups




The prevalence of cervical cancer per 1,000 screening eligible women equaled to 6,1%0 in 2013. The peak of Cervical cancer prevalence (10,5%0) was identified in 60-64 age group (See Chart 3).

Chart 3. The prevalence of cervical cancer per 1,000 (%0) of Pap screening eligible women in Tbilisi, in 2013, according the age groups

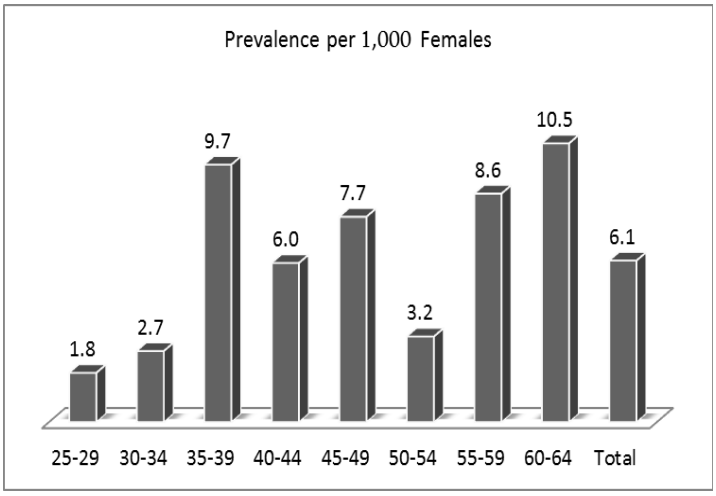
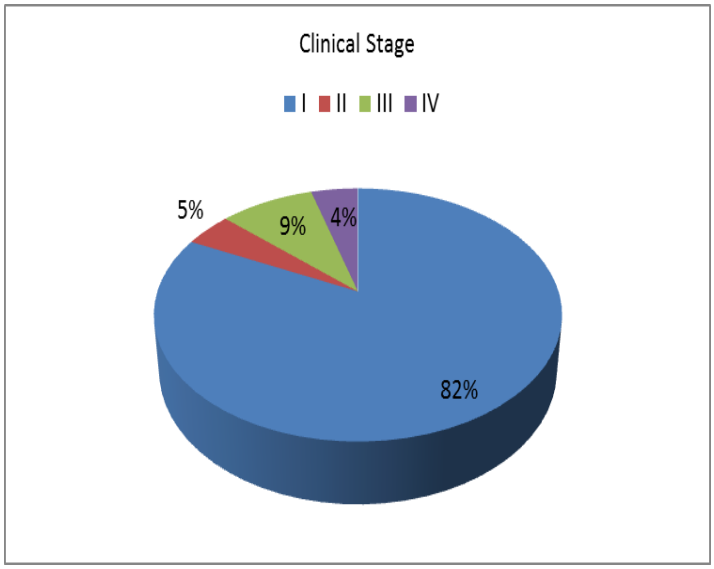



Chart 4. Specific weights of clinical stages of cervical cancer cases detected at the National Screening Center in 2013




The great majority (82%) of 45 cervical cancer cases detected at the National Screening Center in 2013 was diagnosed at I clinical stage (See Chart 4).

Comparison of gynecological examination results with the clinical diagnoses in cervical cancer and CIS cases is provided in a table 2.

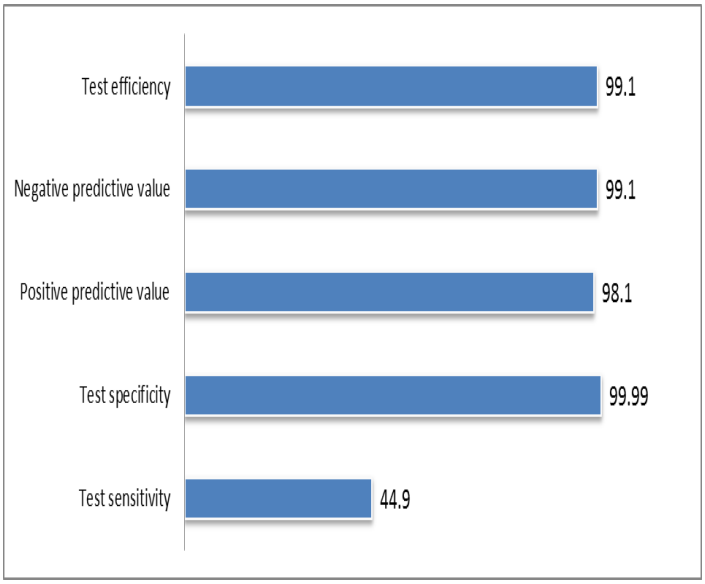
Table 2. Comparison of gynecological examination results with the clinical diagnosis in cervical cancer and CIS cases, detected at the National Screening Center in 2013

| Gynecological examination results | Clinical Diagnose | | Total |
|---|---|---|---|
| | Cancer/ CIS | Standard | |
| Cancer/ CIS | 53 | 1 | 54 |
| Standard | 65 | 7297 | 7362 |
| Total | 118 | 7298 | 7416 |
| $\chi^2$= 3240; p<0,001 | | | |

118 patients from 7,416 women examined at the National Screening Center in 2013 were diagnosed with cervical cancer and CIS, among them in 53 cases, the diagnosis was confirmed by gynecological examination as well. No cervical cancer pathology has been established by gynecological examination of 7,362 women, including 65 cases of CIS, i.e. 0,9% cases of hypo diagnostics and 4,7 % cases of hyper diagnostics have occurred during the gynecological examination.

Diagnostic effectiveness rates of gynecological examination are provided in a chart # 5. Gynecological examination sensitivity equaled to 44,9 %, specificity – 99.99%, positive prognosis ratio - 98.1%, negative prognosis ratio - 99.1%, and the value ratio - 99.1%.

Chart 5. Assessment of the effectiveness of gynecological examination in cervical cancer and CIS cases detected at the National Screening center in 2013




Comparison of Pap test results with the clinical diagnoses in cervical cancer and CIS cases is provided in a table 3.

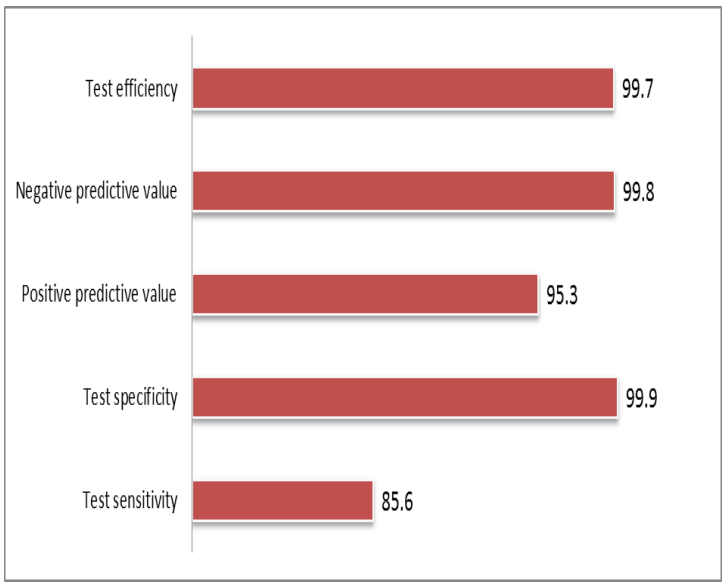
Table 3. Comparison of Pap test results with the clinical diagnosis in cervical cancer and CIS cases, detected at the National Screening Center in 2013

| Pap test results | Clinical diagnoses | | Total |
|---|---|---|---|
| | Cancer/ CIS | Standard | |
| Cancer/ CIS | 101 | 5 | 106 |
| Standard | 17 | 7293 | 7310 |
| Total | 118 | 7298 | 7416 |
| $\chi^2$= 6030; p,0,001 | | | |

118 patients from 7,416 women examined at the National Screening Center in 2013 were diagnosed with cervical cancer and CIS, among them in 101 cases, the diagnosis was confirmed by a Pap test. No cervical cancer pathology has been established by the results of a Pap test in 7,362 women, including 17 cases of CIS, i.e. 0,2 % cases of hypo diagnostics and 4,7 % cases of hyper diagnostics have occurred during the Pap test examination.

Diagnostic effectiveness rates of the Pap test are provided in a chart # 6. Pap test sensitivity equals to 85,6 %, specificity – 99.9%, positive prognosis ratio – 95,3%, negative prognosis ratio – 99,8%, and the value ratio - 99.7%.

Chart 6. Assessment of the effectiveness of the Pap test in cervical cancer and CIS cases detected at the National Screening center in 2013



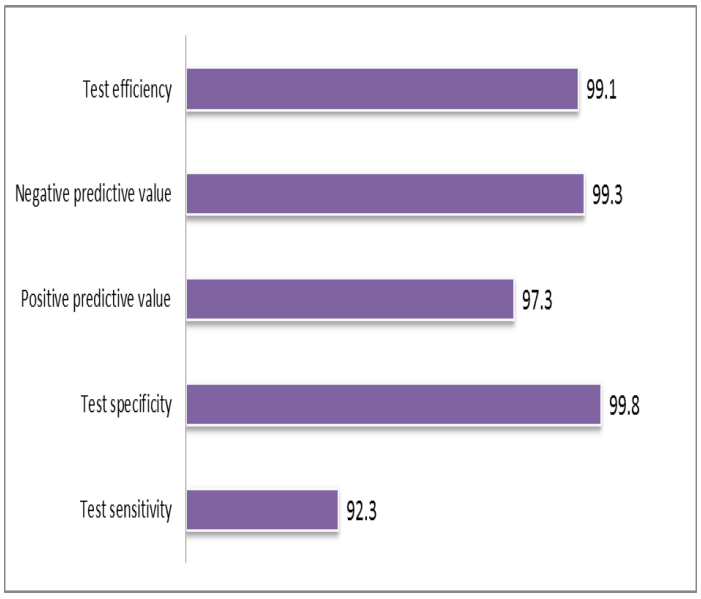

Comparison of colposcopy results with the clinical diagnoses in cervical cancer and CIS cases is provided in a table 4.

Table 4. Comparison of coploscopy results with the clinical diagnosis in cervical cancer and CIS cases, detected at the National Screening Center in 2013

| Colposcopy results | Clinical diagnoses | | Total |
|---|---|---|---|
| | Cancer/ CIS | Standard | |
| Cancer/ CIS | 108 | 3 | 111 |
| Standard | 10 | 1254 | 1264 |
| Total | 118 | 1257 | 1375 |
| $\chi^2$=625 ; p<0,001 | | | |

1,375 women received colposcopy examination at the National Screening Center in 2013. The diagnose of 108 women from 118 cases of cervical cancer and intraepithelial carcinoma was confirmed by colposcopy. No cervical cancer pathology has been established based on colposcopy results in 10 cases. i.e. 0,8 % cases of hypo diagnostics and 3 cases (2,7%) from 111 of hyper diagnostics have occurred.

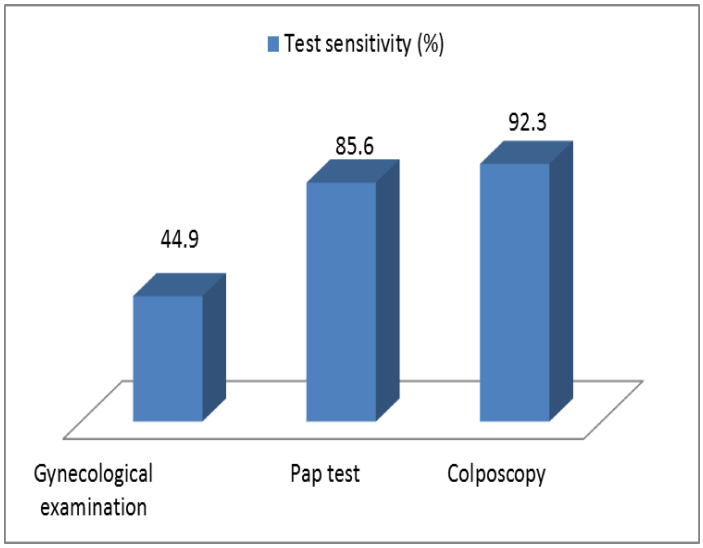
Chart 7. Assessment of the effectiveness of colposcopy in cervical cancer and CIS cases detected at the National Screening center in 2013




Diagnostic effectiveness rates of colposcopy are provided on a chart # 7. Colposcopy sensitivity equals to 91,5 %, specificity – 99.8%, positive prognosis ratio – 97,3%, negative prognosis ratio – 99,2%, and the value ratio - 99.1%.

Relative analysis of the diagnostic effectiveness of gynecological examination, Pap test and colposcopy has shown, that in diagnostics of cervical cancer and intraepithelial carcinoma (CIS), these tests mainly differ in the sensitivity ratio (See Chart 8).

Chart 8. Comparison of the sensitivity of gynecological examination, Pap test and colposcopy in cervical cancer and CIS cases detected at the National Screening center in 2013



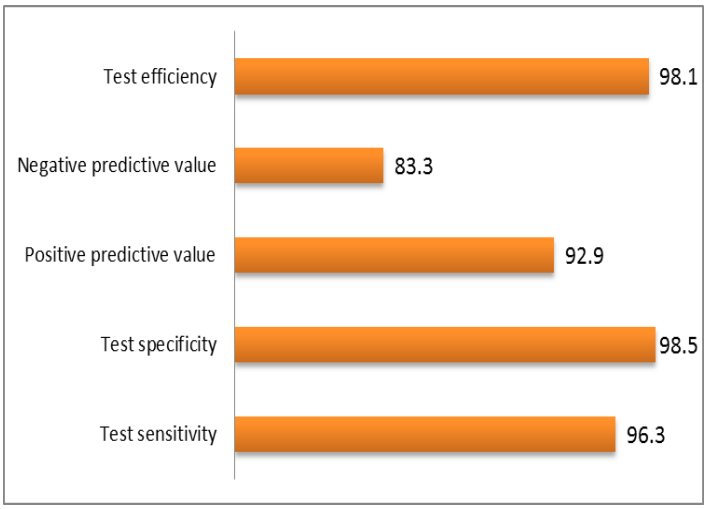

It is known, that test sensitivity reflects the probability, when disease affected individuals are classified as patients. Compared to gynecological examination (44.9%), the high sensitivity rate was noted in Pap test (85,6%) and colposcopy examination (92,3%) cases. In addition to this, special positive feature of the Pap test, as of a main tool of screening, is a low rate of hypodiagnostics (0,2%). Pap test effectiveness significantly increases by the histological test of the material, taken from damaged areas during the colposcopy examination.

In addition, the results of Pap test and colposcopy combination in 162 cases were compared with clinical diagnoses and the effectiveness of this combination was studied (See Table 5 and Chart 9).

Table 5. Comparison of the results of Pap test and colposcopy combination with clinical diagnoses, in cervical cancer and CIS cases detected at the National Screening Center in 2013

| Pap test and colposcopy combination | Clinical diagnoses | | Total |
|---|---|---|---|
| | Cancer/ CIS | Standard | |
| Cancer/ CIS | 26 | 2 | 28 |
| Standard | 1 | 133 | 134 |
| Total | 27 | 135 | 162 |
| $\chi^2$=141 ; p<0,001 | | | |

Chart 9. Assessment of the effectiveness of Pap test and colposcopy combination in cervical cancer and CIS cases detected at the National Screening Center in 2013




Pap test and colposcopy combination sensitivity equaled to 96,3 %, specificity 98.5%, positive prognosis ratio – 92.9%, negative prognosis ratio – 83.3%, and the value ratio - 98.1%.

The absolute quantities of the tests conducted at the National Screening Center and sub-contracting organizations during the 5 year cycle (2010-2014) have been studied for economic assessment of cervical cancer screening program (See Table 6).

Table 6. The absolute quantity of examinations carried out within the framework of cervical cancer screening program, in Tbilisi, during the period of 2010-2014

| Year | Gynecological exam + Pap test | Colposcopy + Biopsy+ Histology |
|---|---|---|
| 2010 | 14,552 | 2,094 |
| 2011 | 12,130 | 2,224 |
| 2012 | 13,151 | 2,499 |
| 2013 | 13,584 | 2,712 |
| 2014 | 12,907 | 2,618 |
| Total absolute quantity | 66,324 | 12,147 |
| % | 100 | 18 |

During the period of 2010-2014, within the framework of the cervical screening program, 66,324 women received gynecological examination and Pap test; and colposcopy, marked biopsy and morphological tests were conducted in 12,147 women, i.e. 18 % of screening eligible women.

The cost of cervical cancer screening conducted in Tbilisi during the period of 2010-2014 is provided in a table 7.

Table 7. Cost of cervical cancer screening, conducted in Tbilisi during the period of 2010 -2014

| Cervical cancer screening | 2010-2014 25-59 age group abso-lute quant. | Cost (GEL) 1 test unit | Cost (GEL) Total (GEL) |
|---|---|---|---|
| Gynecological exam + Pap test | 66,324 | 21.80 | 1,445,863 |
| Colposcopy + Biopsy + Histology | 12,147 | 45.70 | 555,118 |
| Total | | | 2,000,981 |

Total cost of cervical cancer screening provided to 66,324 women in Tbilisi during the period of 2010-2014, equaled to 2,000,981 GEL.

According to the population census of 2002, the number of female population in Tbilisi in 25-59 age group equaled to 290, 007 and in 30-64 age group to 280,883 women.

According to cervical cancer screening guideline being currently in operation, women in 25-59 age group are eligible for screening program, i.e. During the period of 2010-2014, only 23 % of target population eligible for screening have received the test. At the same time, improvement of screening efficiency requires at least 50% coverage of a target group and as it is known, in case of 70 % coverage, actual reduction of cervical cancer related death rate starts.

The cost of cervical cancer screening in 25-59 and 30-64 age groups in case of 50 % and 70 % coverage of the target groups have been calculated, basing on data of female population census of 2002 (See Tables 8 and 9).

To enhance the effectiveness of cervical cancer screening, stage by stage 2-3 times increase of a number of screening eligible women is necessary. To achieve this goal, it is necessary on the one hand to educate the female population of Georgia and develop a habit of getting periodical screening and on the other hand to increase the financing of the screening program. In case of 50 % coverage of 25-59 age group, the cost of the cervical screening program will equal to 4,353,886 GEL and in case of 70 % coverage it will be 6,095,427 GEL. In case of 50 % coverage of 30-64 age group, the cost of the cervical screening program will be 4,216,908 GEL and in case of 70 % coverage it will be 5,903,652 GEL.

As our epidemiological study have showed, making of alteration in screening guideline and re-adjusting of a target group from 25-59 to 30-64 age group will on the one hand increase the number of detected cervical cancer cases (compared to 25-59 age group, cervical cancer incidence rate is 1,2 times higher in 30-64 age group relative to SRR and in 8,8 % higher relative to Relative Frequency; The peak level (10,5%0) of cervical cancer prevalence in screening eligible women group was noted in 60- 64 age group of female population) and on the other hand it will decrease needed expenditures – in case of 50 % coverage of a target group by ~ 137,000 GEL and by ~ 192,000 GEL in case of 70 % coverage. i.e. Making of alterations to the screening guideline and re-adjusting of a target group to 30 -64 age group will significantly enhance the cost-effectiveness of cervical cancer screening.

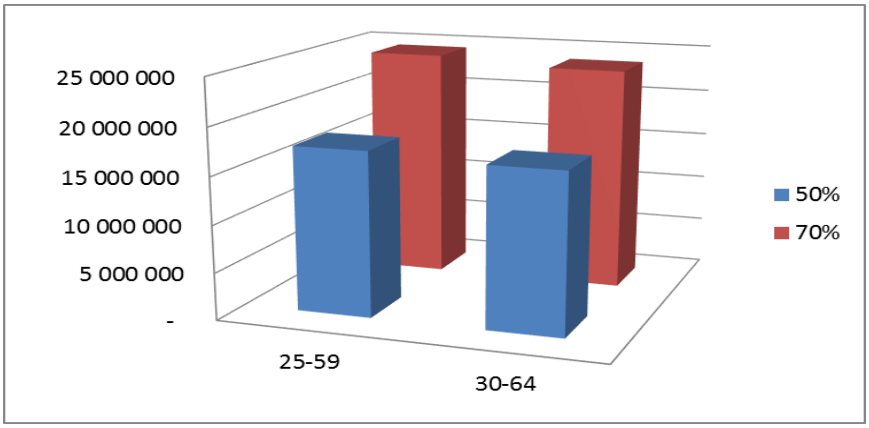
Table 8. Cost of cervical cancer screening in 25-59 and 30-64 age groups of female population based on 2002 census data, in case of 50 % and 70 % coverage of a target group of female population

| Cervical cancer screening | Target group: 25-59 age group | Target group relative to screening coverage | | Cost (GEL) | | |
|---|---|---|---|---|---|---|
| | | | | I test unit | Total | |
| | | | | | Target group coverage | |
| | | 50% | 70% | | 50% | 70% |
| Gynecological exam + Pap test | | 145,004 | 203,005 | 21.80 | 3,161,087 | 4,425,509 |
| Colposcopy + Biopsy + Histology | | 26,101 | 36,541 | 45.70 | 1,192,799 | 1,669,918 |
| Total | 290,007 | | | | 4,353,886 | 6,095,427 |

Table 9. Cost of cervical cancer screening in 30-64 age group of female population based 2002 census data, in case of 50 % and 70 % coverage of a target group of female population

| Cervical cancer screening | Target group: 30-64 age group | Target group relative to screening coverage | | Cost (GEL) | | |
|---|---|---|---|---|---|---|
| | | | | I test unit | Total | |
| | | | | | Target group coverage | |
| | | 50% | 70% | | 50% | 70% |
| Gynecological exam + Pap test | | 140,442 | 196,618 | 21.80 | 3,061,636 | 4,286,272 |
| Colposcopy + Biopsy + Histology | | 25,279 | 35,391 | 45.70 | 1,155,272 | 1,617,380 |
| Total | 280,883 | | | | 4,216,908 | 5,903,652 |

Chart 10. Cost of cervical cancer screening in 25-59 and 30-64 age groups in case of 50 % and 70 % coverage of the target groups




**Conclusions:**

1. The prevalence of severe cervical dysplasia (CIN3) and intraepithelial carcinoma (CIS) per 1,000 screening eligible women equaled to 9,8% in 2013. High rate of cervical dysplasia (CIN3) and intraepithelial carcinoma (CIS) was noted in 35-49 age group of female population
2. The prevalence of cervical cancer per 1,000 screening eligible women equaled to 6,1%. The peak of cervical cancer prevalence (10,5%0) was noted in 60-64 age group. In a great majority (82%) of cervical cancer cases, the disease was diagnosed at I clinical stage.
3. 0,2 % cases of hypo diagnostics and 4,7 % cases of hyper diagnostics have occurred during the Pap test examination. Pap test sensitivity equaled to 85,6 %, specificity – 99.9%, positive prognosis ratio – 95,3%, negative prognosis ratio – 99,8%, and a value ratio - 99.7%.
4. 0,8 % cases of hypo diagnostics and 2,7% of hyper diagnostics have occurred in colposcopy examinations. Colposcopy sensitivity equaled to 91,5 %, specificity – 99.8%, positive prognosis ratio – 97,3%, negative prognosis ratio – 99,2%, and the value ratio - 99.1%.
5. Pap test and colposcopy combination sensitivity equaled to 96,3 %, specificity 98.5%, positive prognosis ratio – 92.9%, negative prognosis ratio – 83.3%, and the value ratio - 98.1%.
6. Making of alteration in screening guideline and re-adjusting of a target group from 25-59 to 30-64 age group will on the one hand increase the number of detected cervical cancer cases and on the other hand will decrease needed expenditures – in case of 50 % coverage of a target group by ~ 137,000 and by ~ 192,000 GEL in case of 70 % coverage. i.e. Making of alterations in the screening guideline and re-adjusting of a target group to 30-64 age group will significantly enhance the cost-effectiveness of cervical cancer screening.

***Recommendations :***

1. To enhance the effectiveness of cervical cancer screening, stage by stage 2-3 times increase of a number of screening eligible women is necessary. To achieve this goal, it is necessary on the one hand to educate the female population of Georgia and develop a habit of getting periodical screening and on the other hand to increase the financing of the screening program. In case of 50 % coverage of 25-59 age group, the cost of the cervical screening program will equal to 4,353,886 GEL and in case of 70 % coverage it will be 6,095,427 GEL. In case of 50 % coverage of 30-64 age group, the cost of the cervical screening program will be 4,216,908 GEL and in case of 70 % coverage it will be 5,903,652 GEL.
2. Based on the conducted epidemiological study, it is recommended to make an alteration in a screening guideline and re-adjust a target group from 25-59 to 30 -64 age group that will on the one hand increase the number of detected cervical cancer cases and on the other hand will decrease needed expenditures – in case of 50 % coverage of a target group by ~ 137,000 GEL and by ~ 192,000 GEL in case of 70 % coverage. i.e. Making of alterations to the screening guideline and re-adjusting of a target group of 30-64 age group will significantly enhance the cost-effectiveness of cervical cancer screening.

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**Relation of Overweight and Obesity with Demographic and Behavioral Factors**

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**Summary**

Overweight and obesity are risk factors for chronic diseases, among them diabetes, cardiovascular diseases, cancer, etc. There are many factors that influence development of obesity and overweight, among them demographic and social data, genetics, lifestyle. The objective of our study is to determine the correlation of overweight and obesity with demographic data, social and behavioural factors, in Georgian population for males and females in the age group 18-64. The source of research was the database for non-communicable diseases risk factor prevalence in Georgia conducted in 2010-2011; Representative samples of adults aged 18-64 years had been analysed 6469 persons (4453 women and 1840 men) in a whole. BMI (kg/m2) was dependent variables in separate multiple linear regression models for which predictors were identified 1. Demographic and social factors - sex, age, education, marital status, working status 2. Behavioural factors: Daily physical activity, alcohol consumption rate during last month, number of meal servings during the day (1,2,3,4), smoking status. As the method of analyses also were used Chi-square test to compare the groups according to BMI and calculation of odds ratios. Lifestyle, dietary behaviour, social status, and other socio-demographic factors affect BMI differently. Age has the strong impact on the likelihood of overweight and obesity. Exercise reduces the probabilities of being overweight and obese and the level of BMI among overweight individuals. Depending on the results of the study health education programs can be targeted at individuals susceptible to overweight and obesity also useful recommendations maybe outlined according to sex, marital status, age, etc.

***Abbreviation:*** *BMI– Body Mass Index.*

***Key words****: Lifestyle, demographic and behavioral factors**, obesity, overweight, regression model, Georgia.*

**Problems statement**

Obesity and overweight are among the major public health issue in developing and developed countries. Individuals who are affected by overweight and obesity are at increased risks for different diseases, including hypertension , hypercholesterolemia, diabetes, coronary heart disease, stroke, cancer, poor reproductive health, and psychological problems such as depression and eating disorders (James, W. P. T. 1995).

According to evolutionary history people always struggled to procure food, but situation significantly changed recently as they don't need much efforts to gain the food. Accordingly overweight, obesity and physical inactivity became the common problem of society (Kushner, R. F. & Foster, G. D. 2000).

Different studies had been conducted that showed the positive relationship of overweight and chronic diseases, also the inefficacy of diets. In USA this is the big problem as despite of high expenses that are aimed to lowering overweight and obesity, the prevalence of those conditions dramatically increased (Willett, W. c.2002).

Obesity maybe caused by genetic disorders, though mostly it's caused by unhealthy dietary habits and physical inactivity.

The major determinant of obesity and overweight is BMI (weight/height $^2$). Normal BMI is between 18.5 and 25, Overweight is from 25 to 29.9. Obesity exist when BMI is more than 30.

Obesity prevalence varies according to different factors, i.e.: Sex, Race, age, social and economic conditions, etc. Socioeconomic status influence the prevalence of obesity and overweight. Less educated population is more obese than educated ones, especially women. Such difference was not observed in men population (Hermann S, 2011).

Obesity prevalence is also influenced by the race, as black women are more obese compared with whites, that is also linked with greater prevalence of diabetes in this population (Seidell, J. c. & Flegal, K. M. 1997).

The scientists distinguish different type of fat distribution on the body, i.e. apple-shaped and pear-shaped people. Health risks are greater in apple shaped people. Such distribution is mostly present in men. The measure of fat distribution is waist/ hip ratio. The health risks increase when WHR is more than 1 in men and more than 0.8 in women ( Ross, R., Shaw, K. D., 2001).

Obesity is present also among the children and is increasing in alarming rate. The NHANES survey determined that obesity prevalence has increased from 5 to 15 % since 2000 in children. The prevalence is different according to ethnicity, composing 27 % of Mexican boys and 25 % of black girls (Flegal KM, 2010).

The main cause of obesity is unhealthy diet and physical inactivity. More efforts are made to change the unhealthy eating patterns of population (Tohill BC, Seymour J, Serdula M, *et al*.: 2004 ) The food pyramid has been implemented to promote healthy eating habits in humans. The pyramid contains the twelve version for the people of different age, sex, race, ethnicity, activity level, so that people can choose their appropriate option.

According to dietary surveys, population begun to consume the recommended products but not in sufficient amount ( appropriate number of servings during the day). They do not usually eat fresh fruit and vegetables, but instead canned and iced products. The paradox is that African Americans who used to eat healthy food, became adopted to fast food that has been associated with higher income (Tohill et. Al 2004).

Influencing the person's eating habits during childhood may prevent from developing obesity during adulthood (Edmunds L., Waters, E. & Elliott, E. J. 2001).

According to the report of Institute of Medicine, the federal, state and local government should participate in the programs for obesity prevalence reduction to make them successful. The recommendations include creating and implementing healthy eating standards at schools, also working out educational programs about the harm of junk foods.

**Aim of Research**

Existing study is aimed to analyze the effects of socio-demographic and lifestyle variables on body weight. The theoretical literature confirms that different factors such as sex, age, marital status, educational level, working status , alcohol and tobacco usage, also level of physical activity and amount of daily meal courses greatly affect BMI changes.

This study addresses the differentiated effects of socio-demographic and lifestyle variables on BMI. We examine the effects of socio-demographic and lifestyle variables on body weight by using quantitative methods of the analyses. These estimates allow testing of the hypothesis that the relationship between obesity and the underlying factors varies in different extent.

**Target groups and methodology of research**

Data had been drawn from STEPS 2010- 2011 database (stepwise approach to surveillance) , spread of non-communicable disease risk- factors in Georgia, which collected information about socio-demographic, behavioural, anthropometric, biochemical measurements for Georgian population. Our sample included 6469 adults aged ≥18. Had been conducted secondary analyses of the provided data.

The WHO STEP wise approach to Surveillance (STEPS) is a simple, standardized method for collecting, analysing and disseminating data in WHO member countries. By using the same standardized questions and protocols, all countries can use STEPS information not only for monitoring within-country trends, but also for making comparisons across countries. The approach encourages the collection of small amounts of useful information on a regular and continuing basis. The STEPS Instrument covers three different levels of "steps" of risk factor assessment. These steps are:: Questionnaire, Physical measurements, Biochemical measurements.

In our study data analyses had been conducted with the method of quantitative research, i.e. Chi-square test and regression analyses. Regression analysis is a statistical tool for the investigation of relationships between variables. To seek the causal effect of one variable upon another. In such analyses also typically is assessed the "statistical significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship. We used multiple regression tool as it is valuable for quantifying the impact of various simultaneous influences upon a single dependent variable. Further, because of omitted variables bias with simple regression, multiple regression is often essential even when one is only interested in the effects of one of the independent variables (Astrid Schneider, Gerhard Hommel, Maria Blettner 2010).

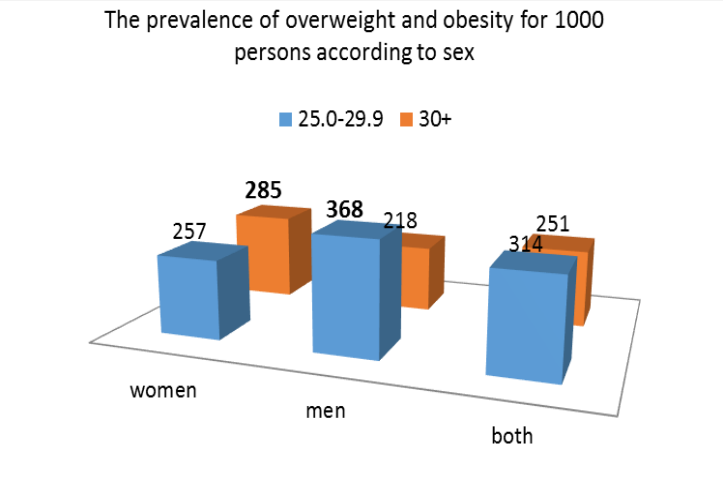
Multiple regression tool had been used in our study to investigate the relation between dependent variable BMI and independent variables . The dependent variable, BMI, is determined as self-reported weight (in kilograms) divided by the square of self-reported height (in meters). Independent variables had been divided into two groups, i.e. demographic and behavioral factors. In the analyses with demographic information had been included the following determinants: sex, education, age, marital status, working status for last 12 months.

In the analyses with behavioural risk-factors had been analysed the following: daily physical activity (minimum 10 minutes), amount of daily meal course, tobacco usage, alcohol consumption for the last 12 months.
T-test method had been used to analyse the difference of BMI between groups.

**Results of the research**

Among 6293 persons (4453 women and 1840 men) for whom information about BMI was available had been determined that overweight (BMI 25 – 29.9) prevalence per 1,000 people in both sexes is 314. Overweight prevalence per 1,000 women is 257 and for men 368. The obesity prevalence ( BMI 30+) per 1,000 people is 251, while for women is 285 and men 218. The prevalence of overweight is more in men, but obesity in women.

Illustration 1. The prevalence of overweight and obesity per 1,000 persons according to sex




In the regression analyses with demographic data, had been included several groups for each independent variables.
According to marital status: 1. Not married, 2. Married, 3. Living separately, 4. Divorced, 5, widow. According to education level : 1. No education, 2. Primary incomplete 3. Primary complete 4. Incomplete secondary, 5. Complete secondary 6. University degree.
According to working status: 1. Government worker, 2. Non- government employee 3. Self-employee 4. Uncompensated 5. Student 6. Housewife 7. Pensioner 8. Unemployed.

The analyses had been performed via SPSS using multiple regression method.

Strongest relation had been found between age and body mass index that means that among the demographic factors age is the strongest determinant of BMI change , i.e. with increase of age body mass index value also increases. This correlation is statistically significant. According to analyses, sex is not determinant of BMI changes, the relation had not been found to be statistically significant. It's more realistic that sex only is not the determinant of development of obesity, but other factors in line with it should be foreseen during the analyses.

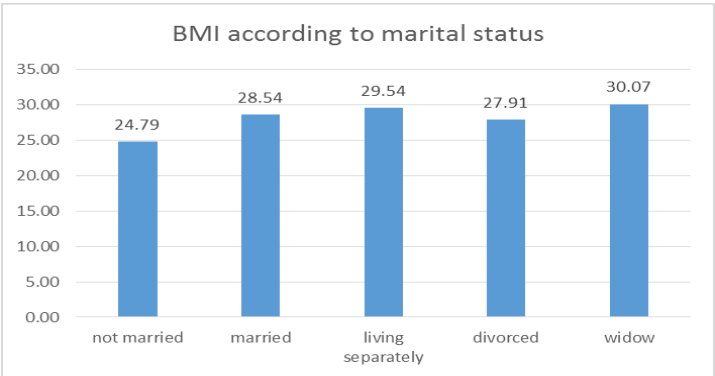
Table 1. Demographic factors (list of dependent variables)

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 30.300 | .230 | | 131.839 | |
| | age_18_24 | -5.693 | .559 | -.146 | -10.185 | .000 |
| | age_25_34 | -3.950 | .428 | -.119 | -9.220 | .000 |
| | age_35_44 | -1.658 | .386 | -.055 | -4.293 | .000 |
| | Marital status | -1.419 | .441 | -.045 | -3.220 | .001 |
| | Educational level | -.677 | .302 | -.028 | -2.238 | .025 |
| | Sex | -.490 | .331 | -.019 | -1.481 | .139 |
| | Working status | -.666 | .375 | -.023 | -1.777 | .076 |

Independent variable BMI

The correlation between marital status and BMI is statistically significant. According to the results gained via T-Test analyses, the lowest BMI had been observed in unmarried individuals and increased in married persons. Though, recommendations maybe outlined for married couples to follow regular eating habits (i.e. 3 -4 meal courses per day approximately the same time of the day) and not to cease physical activity after marriage. BMI lowered again in divorced individuals.

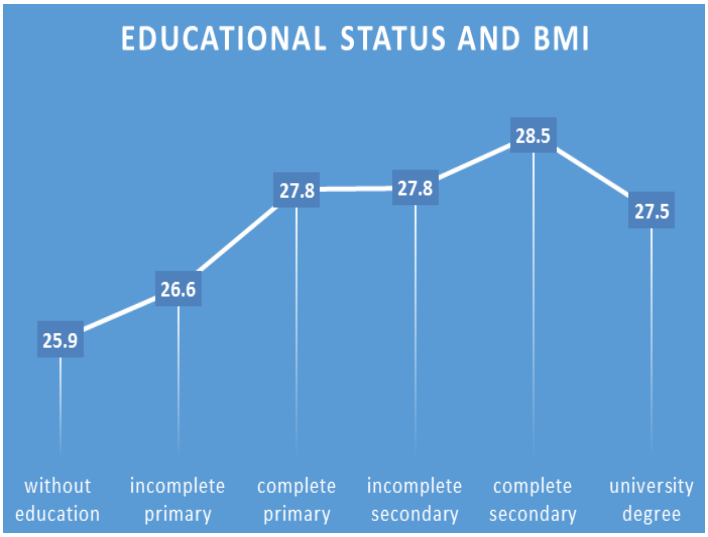
Illustration 2. BMI according to marital status




Statistically significant relation had not been found between working status and BMI. As for educational level the relation is statistically significant and education level maybe the determinant of obesity development.

Though in the analyses of educational groups with T-test , the highest value was found for individuals with complete secondary and the lowest for people with no education. Accordingly all individuals, despite of their educational level need information and training for maintaining healthy eating habits and physical activity skills.

Illustration 3. BMI according to educational status




On the basis of results described above, several recommendations were worked out:

- To avoid intake of high calorie food with increasing of age
- To control BMI value after marriage as it's obvious the tendency of weight gain after marriage
- To create guidelines for maintaining of healthy eating habits and promoting physical activity that will be comprehensible for individuals with any educational level.

Multiple regression method had been used to determine correlation between behavioral risk-factors and BMI. The following variables were included in the analyses: daily physical activity (minimum 10 minutes), amount of daily meal course, tobacco usage, alcohol consumption for the last 12 months.

Table 2. Multiple regression analyses (behavioural factors).

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 27.97 | 1.06 | | 26.42 | .000 |
| | Daily 10 minute physical activity | -.823 | .401 | -.035 | -2.05 | .041 |
| | Meal course_1_3 | .26 | .36 | .013 | .72 | .472 |
| | Meal course_5_6 | 1.72 | .71 | .042 | 2.43 | .015 |
| | Tobacco | -1.40 | .41 | -.063 | -3.45 | .001 |
| | Alcohol consumption | .16 | .22 | .013 | .74 | .461 |

Independent variable BMI

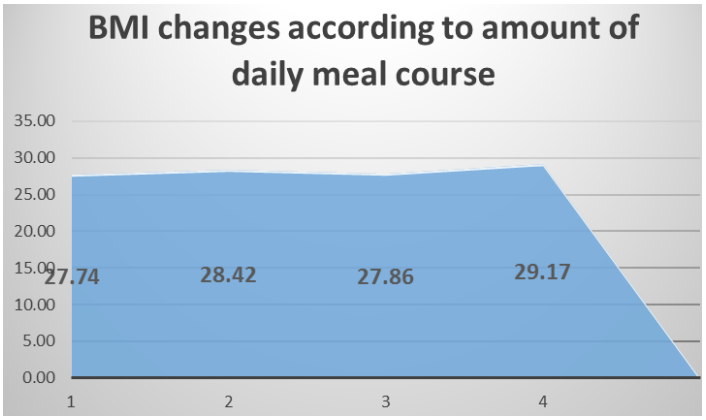
The strongest correlation had been revealed between tobacco usage and BMI and this correlation is statistically significant. The more tobacco usage is associated with lower value of BMI, though tobacco usage should not be promoted due to its negative influences on various health parameters.

Table 3. BMI distribution according to tobacco usage

| Tobacco usage | Mean BMI | N | Standard deviation |
|---|---|---|---|
| yes | 26.79 | 1181 | 8.09 |
| no | 28.41 | 5221 | 12.29 |
| total | 28.11 | 6402 | 11.64 |

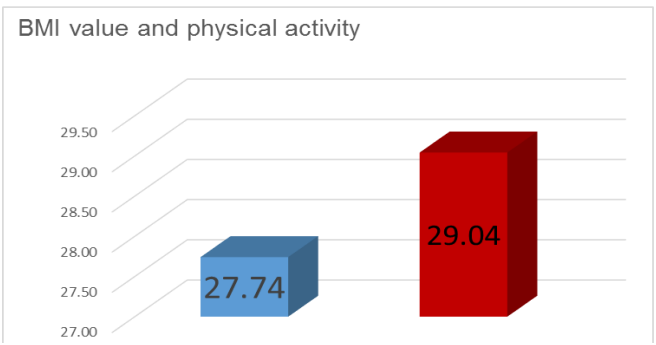
The weak positive correlation had been found between daily meal courses and BMI changes, furthermore, according to literature, the normal BMI value is maintained if meal courses are taken at the same time and approximately the same amount during the day. Accordingly, while providing the recommendations about healthy eating habits should be outlined the stable regimen of food intake.

Illustration 4. Daily servings and BMI




Daily 10 minute physical activity also influences BMI, i.e. in persons who undertake daily 10 minute walking or any other type of physical activity BMI is less than in individuals who are not dealing with such activity at all. So, promotion of physical activity is also important part of maintaining normal BMI.

Illustration 5. BMI value according to daily physical activity



**Conclusions:**

1. Prevalence of overweight (BMI 25.0-29.9) for 1000 people in both sexes is 314. That for obesity (BMI 30+) is 251. The prevalence of overweight is more in men (368‰), but obesity in women (285‰);
2. The overweight and obesity prevalence increases with age and the peak is reached for age 45-54 and 55-64. In age group 45-54 obesity and overweight is more prevalent in men ( 860‰) and in age group 55-64 more prevalent in women ( 925‰), accordingly the tendency for weight gain in men begins earlier;
3. Higher BMI value is related to certain social and demographic factors. In persons with postgraduate education BMI value is 1 kg/$m^2$ less compared with people with secondary education. High values of BMI had been identified in married couples (28.5) , people who live separately (29.5) and widows (30.1);
4. Higher BMI value is related to certain behavioural factors. In the case of daily meal course amount 4 – BMI value was 29.2 and it was higher compared with meal ingestion 3 times daily (BMI value more for 1.3 kg/$m^2$). BMI is related to frequency of meat ingestion (t=3.4), vegetable consumption (t=2.8) , fast food usage (t= 3.0), tobacco usage (t=-3.5) and physical activity (t=-2.0);
5. The negative correlation had been found between BMI value and physical activity, i.e. more time is spent on physical activity the lower is BMI value. In persons who underwent at least 10 minute daily activity the mean BMi value was 27.7 and it was 1.3 kg/$m^2$ less compared with persons without any physical activity.

**Recommendations:**

On the basis of research results had been worked out following recommendations:

1. From the purposes of disease prevention and increasing life expectancy Georgian population need to control their BMI value, refuse from high calorie food intake, increase physical activity and maintain energetic balance;
2. BMI value monitoring is necessary for the groups who have tendency of developing overweight and obesity, such as age 50 or more, married and separately living couples, housewives, persons who uses fast food frequently, also persons with different diseases in anamnesis and heredity (i.e. diabetes mellitus, high arterial pressure, stroke);
3. To control BMI value after marriage as it's obvious the tendency of weight gain after marriage.

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**Risk of Different Diseases in Georgian Population with Overweight and Obesity**

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**Summary**

According to evolutionary history people always struggled to procure food and needed physical efforts for this purpose. Situation significantly changed recently as they don't need much efforts to gain the food. Accordingly overweight, obesity and physical inactivity became the common problem of society. Different studies had been conducted that showed the positive relationship of overweight and chronic diseases, also the inefficacy of diets. The current study had been designed to evaluate the correlation of different diseases and BMI value. Also to calculate the risks of diseases development in the case of overweight and obesity. In the statistical analyses had been included myocardial infarction, hypertension, stroke, etc. The material for the study had been obtained from the survey of non-communicable disease risk factors, conducted in Georgia in 2010- 2011. Target group included males and females in the age group 18-64. Had been analysed 6,469 persons (4,453 women and 1,840 men) in a whole. As the method of analyses were used Chi-square test, multiple regression analyses, calculation of odds ratio and relative risk. The current analysis indicates that increased BMI is associated with increased risk of cancer, stroke, myocardial infarction, diabetes, etc. and therefore, can be prevented if managed precisely. This analysis found that overweight and obesity are strongly associated with the existence of following disease in the anamnesis: Myocardial infarction, cancer, stroke. Future research will be able to compare the relative existence of different diseases across BMI categories to identify additional health risks and work out effective preventive measures.

***Abbreviations:*** *BMI– Body Mass Index, RR-Relative Risk, OR-Odds Ratio, MI- myocardial infarction.*

***Key words:*** *Body mass index, overweight, obesity, relative risk, odds ratio, myocardial infarction, stroke, cancer, diabetes mellitus, heredity, Georgia.*

**Problems statement:**

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer (Roux I., Pratt M., 2008).

Chronic diseases, such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are by far the leading cause of mortality in the world, representing 60% of all deaths. Out of the 35 million people who died from chronic disease in 2005, half were under 70 and half were women (WHO, 2014).

According to European Health report, it's possible to prevent the conditions that cause death. The main risk-factors are the following: High blood pressure, high level of cholesterol, etc. The basis for those conditions is overweight, accordingly, it's possible to work-out and embed effective preventive measures (WHO, 2003).

Once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings.

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed on one hand, and calories expended on the other hand.

For people who are considered obese (BMI greater than or equal to 30) or those who are overweight (BMI of 25 to 29.9) and have two or more risk factors, it is recommended to lose weight. Even a small weight loss will help to lower risk of developing diseases associated with obesity (Roux I., Pratt M., 2008). People who are overweight, do not have a high waist measurement, and have fewer than two risk factors may need to prevent further weight gain rather than lose weight.

Even a small weight loss (between 5 and 10 percent of current weight) will help to lower risk of different disease development.

Obesity maybe associated with various co-morbidities: hypertension, type 2 diabetes (Astrup & Finer, 2000), coronary heart disease (CHD) (Hubert H., Feinleib M. et.al.,1983), stroke, gallbladder disease, and sleep apnoea. Any person may develop diabetes, heart disease, and other

weight-related health risks with increasing body mass index (BMI).

In recent years there is increasing tendency of overweight and obesity in Georgia. This causes increased flow of patients to hospitals and outpatient clinics due to such diseases as hypertension, diabetes mellitus, ischemic heart disease etc. According to World Health Organization – 1 milliard people worldwide are overweight , approximately 300 million are obese *(Obesity: preventing and managing the global epidemic*. Geneva: World Health Organization; 2002).

Though obesity and overweight has serious physical consequences , cause different disorders , various health problems, it also has economic impact (Thompson & Wolf, 2001).

Obesity and overweight are not result of only unhealthy diet but also the lack of physical activity. All weight reduction programs may be successful if they consist of combination of diet and physical activity (Lee IM, Djoussé L, et.al. 2010). Increasing awareness of the disorders with the strongest associations with obesity is important to allow early diagnosis and treatment of these conditions, and to identify the patients most likely to benefit from weight loss. This will allow early identification and assessment of risk so that appropriate interventions can be implemented to reduce risk and mortality.

In a whole, it's obvious that overweight and obesity are associated with development of different diseases. Currently the trends of keeping diet are increasing though not enough to reduce obesity prevalence worldwide. Different approaches must be created to change the dietary patterns of individuals, as well as their attitude to physical activity to keep them from developing health problems.

**Aim of research**

The aim of current study is to to describe the relationship between weight status and prevalence of different diseases in Georgian population , to determine association between those conditions in anamnesis and BMI value, to identify the risk groups according to BMI values; to optimize the high risk groups of population and embed effective screening measures according to the needs of groups.

**Target groups and methodology of research**

In this scientific paper was analysed the distribution of overweight and obesity in the target groups – Georgian men and women in the age range 18-64 . Also had been determined the relative risks of different diseases in the overweight and obese population, The analyses was conducted according to sex and age groups as well.

The population of our research were men and women from age 18 to 64 who were included in the non-communicable risk-factor survey conducted in Georgia in 2010-2011. The method by which this survey had been conducted is stepwise approach to surveillance, STEPS. Usually this method uses the same standardized questions and protocols to collect, analyse and disseminate the data in WHO member countries. In the questioner chronic disease was based on self-reported occurrence, based on the question - Have you had any of the following in the last 12 months? Chronic diseases included in this analysis were cholesterol level in the blood, glucose level in the blood, stroke in anamnesis, myocardial infarction in anamnesis, cancer in anamnesis.

Self- reported height and weight were used to calculate BMI as a measure of overweight and obesity. BMI was categorised into four groups: underweight 15.0-18.49 kg/$m^2$, normal weight 18.5-24.99 kg/$m^2$, overweight 25.0-29.99 kg/$m^2$, and obese $\geq$30 kg/$m^2$.

At the first stage chi-square test had been used in our study to determine BMI distribution within groups. . The independent variables included in the analyses were the existence of following diseases in the anamnesis: stroke, cancer, high level of cholesterol, myocardial infarction. Had been compared different groups according to BMI value and was determined statistically significant differences among groups. Chi-square test gave chance to approve null hypothesis- BMI value is higher in the population with existence of the diseases in anamnesis. The test showed whether the difference between groups was statistically significant or no.

On the second stage had been created regression model to determine regression relationship between group of factors and dependent variable. Such analyses had been conducted to evaluate if change of independent factors influence change of BMI value – constant variable. It was also determined if correlation exists between variables.

At the next stage was calculated the odds ratio and relative risk values for different diseases for overweight and obese population. The following diseases were included in the analyses: stroke, myocardial infarction, diabetes mellitus, cancer. The risks of disease development had been analysed also according to sex and age groups compared with normal weight population.

**Results of the research**

At the first stage had been analyzed BMI distribution in the case of disease existence in anamnesis. The following results were obtained.

Illustration 1.

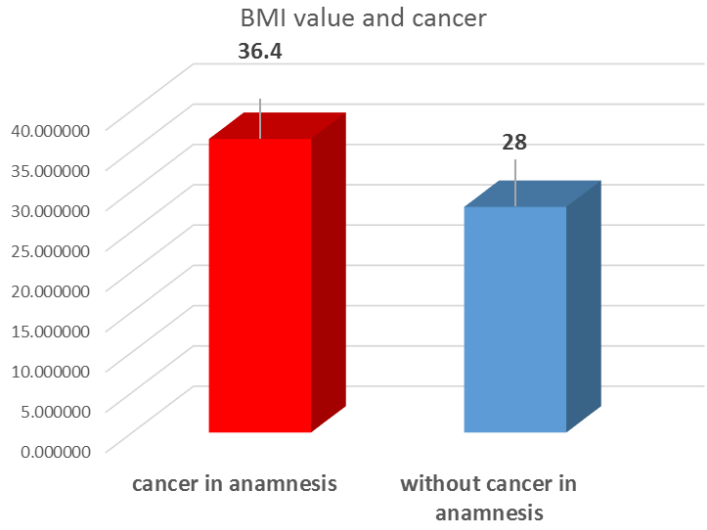



Table 1. BMI value and cancer

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| BMI_A BMI * cancer | Between Groups | (Combined) | 5883.75 | 1 | 5883.747 | 43.68 | .000 |
| | Within Groups | | 862016.06 | 6400 | 134.690 | | |
| | Total | | 867899.81 | 6401 | | | |

The difference between groups was statistically significant. In our study was not determined localization of cancer so those results indicate BMI value in the case of cancer of any localization.

For stroke, the following result was obtained:

Table 2. BMI value and stroke

| | | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|---|
| BMI_A BMI * Stroke | Between Groups | (Combined) | 2352.39 | 1 | 2352.39 | 17.39 | .000 |
| | Within Groups | | 865547.41 | 6400 | 135.24 | | |
| | Total | | 867899.8 | 6401 | | | |

The difference between groups is statistically significant ( P<0.05). In the case of stroke in the anamnesis average BMI value was 33 in this group, while without stroke, it has been determined to be 28.

Illustration 2.

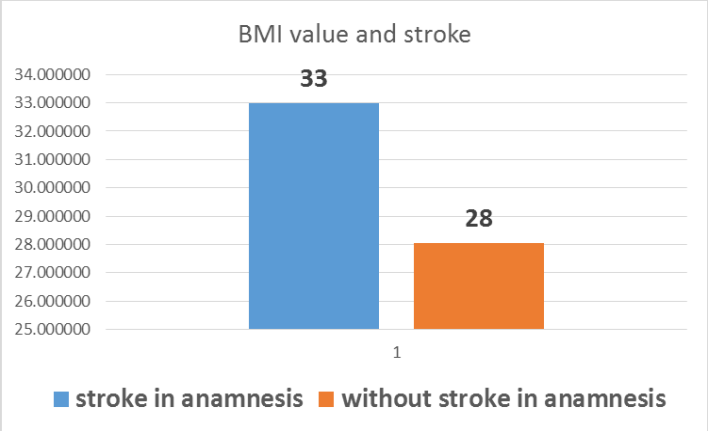



Illustration 3.

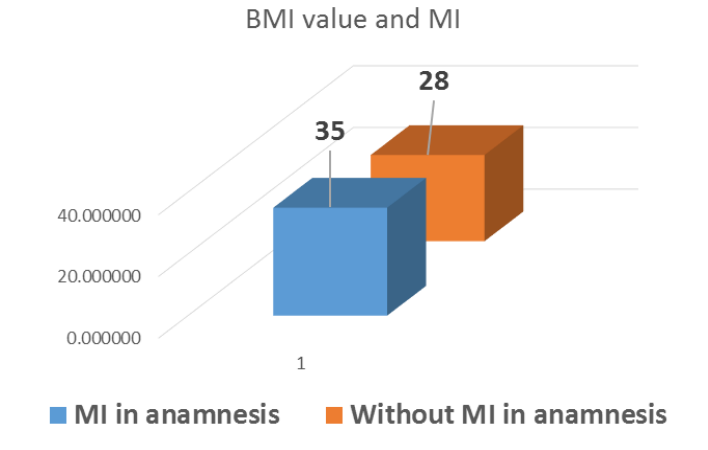
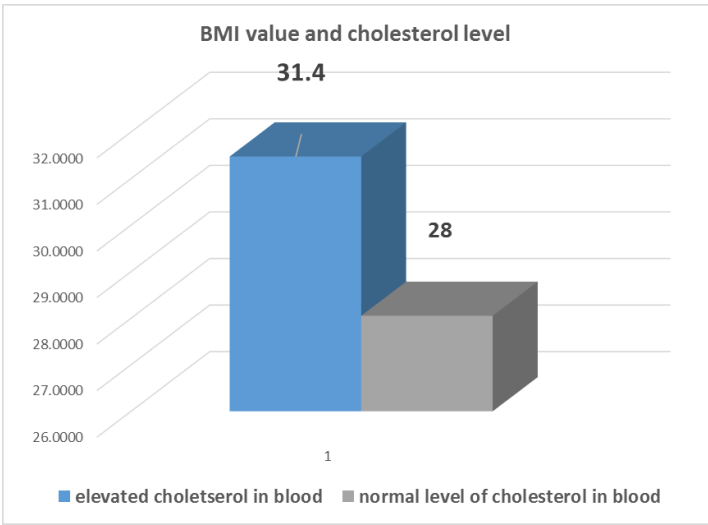



Illustration 4.




In all cases difference between groups was statistically significant ( P<0.05). The above mentioned results confirmed research hypothesis –in the case of any above disease existence in anamnesis BMI value is higher in Georgian population males and females.

Multiple regression analyses was conducted for biochemistry parameters in the blood. For 6402 persons had been determined cholesterol and glucose level in the blood. Those independent variables were included in the regression model, and BMI as constant variable.

Table 3. Biochemistry parameters in the blood and BMI

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 1 | (Constant) | 31.218 | 2.383 | | 13.098 | .000 |
| | Fasting glucose level | .026 | .004 | **.083** | 6.440 | .000 |
| | Cholesterol level in blood | 2.895 | 1.168 | .032 | 2.479 | .013 |

The strong positive relation was revealed between those variables. Both of them are affected by body mass index value. The higher level of glucose in the blood, the higher value of BMI exists, the same is true for cholesterol level. The above result indicates that persons with high BMI value need to control their glucose and cholesterol level in the blood to determine certain diseases at early stage.
In the regression model the following diseases were included: stroke, myocardial infarction and cancer as independent variables and BMI as dependent variable.

Table 4. Diseases in anamnesis and BMI value – regression analyses

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| **1** | **(Constant)** | **27.77** | **.15** | | **187.152** | **0.000** |
| | **Stroke in anamnesis** | **3.68** | **1.19** | **.039** | **3.09** | **.002** |
| | **Cancer in anamnesis** | **7.99** | **1.27** | **.078** | **6.29** | **.000** |
| | **Myocardial infarction in anamnesis** | **6.30** | **.96** | **.083** | **6.59** | **.000** |

In all cases strong positive correlation was revealed. The result was statistically significant (P<0.05). That means high BMI value maybe predictor for existing of any of those diseases.

In our research was also studied the relative risks of different diseases in the case of overweight and obesity.

The relative risks were identified for following diseases: stroke, myocardial infarction, diabetes mellitus, cancer.

Table 5. Risk of stroke development in obese population

| BMI | | | | stroke yes | stroke no | Total |
|---|---|---|---|---|---|---|
| 30 + | age | 50 + | Count | 39 | 1133 | 1172 |
| | | | % within age | 3.3% | 96.7% | 100.0% |
| | | | % within stroke | 88.6% | 57.1% | 57.8% |
| | | -49 | Count | 5 | 850 | 855 |
| | | | % within age | 0.6% | 99.4% | 100.0% |
| | | | % within stroke | 11.4% | 42.9% | 42.2% |
| | | Total | Count | 44 | 1983 | 2027 |
| | | | % within age | 2.2% | 97.8% | 100.0% |
| | | | % within stroke | 100.0% | 100.0% | 100.0% |
| 18-24.99 | age | 50 + | Count | 13 | 649 | 662 |
| | | | % within age | 2.0% | 98.0% | 100.0% |
| | | | % within stroke | 65.0% | 30.0% | 30.3% |
| | | -49 | Count | 7 | 1515 | 1522 |
| | | | % within age | 0.5% | 99.5% | 100.0% |
| | | | % within stroke | 35.0% | 70.0% | 69.7% |
| | | Total | Count | 20 | 2164 | 2184 |
| | | | % within age | 0.9% | 99.1% | 100.0% |
| | | | % within stroke | 100.0% | 100.0% | 100.0% |
| Total | age | 50 + | Count | 52 | 1782 | 1834 |
| | | | % within age | 2.8% | 97.2% | 100.0% |
| | | | % within stroke | 81.3% | 43.0% | 43.6% |
| | | -49 | Count | 12 | 2365 | 2377 |
| | | | % within age | 0.5% | 99.5% | 100.0% |
| | | | % within stroke | 18.8% | 57.0% | 56.4% |
| | | Total | Count | 64 | 4147 | 4211 |
| | | | % within age | 1.5% | 98.5% | 100.0% |
| | | | % within stroke | 100.0% | 100.0% | 100.0% |

According to given data, in the case of obesity ( BMI >29.9) men and women above 50 have anamnesis of stroke in 88.6% cases, below 50 in 11.4 % cases ($X^2$=3.8; P<0.05).

With increasing of age risk of stroke development increases 6 times in obese population compared with normal weight people ( 95% CI 2.3- 15.0).

Table 6. Risk of MI in the case of obesity

| | | | Myocardial infarction yes | Myocardial infarction no |
|---|---|---|---|---|
| **BMI obesity** | **30 +** | **Count** | **78** | **1949** |
| | | **% within BMI obesity** | **3.8%** | **96.2%** |
| | | **% within Myocardial infarction** | **76.5%** | **47.4%** |
| | **18-24.99** | **Count** | **24** | **2160** |
| | | **% within BMI obesity** | **1.1%** | **98.9%** |
| | | **% within Myocardial infarction** | **23.5%** | **52.6%** |
| **Total** | | **Count** | **102** | **4109** |
| | | **% within BMI obesity** | **2.4%** | **97.6%** |
| | | **% within Myocardial infarction** | **100.0%** | **100.0%** |

According to results in obese population ( BMI >29.9) 76.5% of MI cases were observed while in normal weight population ( BMI 18-24.99), 23.5 % of MI cases were observed ($X^2$=33.6; P<0.05). In obese population risk of MI development is 3.6 times higher compared with normal weight population ( 95% CI 2.3- 5.7).

Table 7. Risk of MI development in overweight and obese population according to age

| BMI_overweight_obesity | | | | Myocardial infarction | | Total |
|---|---|---|---|---|---|---|
| | | | | yes | no | |
| 25 + | age | 50 + | Count | 107 | 2066 | 2173 |
| | | | % within age | 4.9% | 95.1% | 100.0% |
| | | | % within Myocardial infarction | 82.3% | 52.6% | 53.5% |
| | | -49 | Count | 23 | 1863 | 1886 |
| | | | % within age | 1.2% | 98.8% | 100.0% |
| | | | % within Myocardial infarction | 17.7% | 47.4% | 46.5% |
| | | Total | Count | 130 | 3929 | 4059 |
| | | | % within age | 3.2% | 96.8% | 100.0% |
| | | | % within Myocardial infarction | 100.0% | 100.0% | 100.0% |
| 18-24.99 | age | 50 + | Count | 19 | 643 | 662 |
| | | | % within age | 2.9% | 97.1% | 100.0% |
| | | | % within Myocardial infarction | 79.2% | 29.8% | 30.3% |
| | | -49 | Count | 5 | 1517 | 1522 |
| | | | % within age | 0.3% | 99.7% | 100.0% |
| | | | % within Myocardial infarction | 20.8% | 70.2% | 69.7% |
| | | Total | Count | 24 | 2160 | 2184 |
| | | | % within age | 1.1% | 98.9% | 100.0% |
| | | | % within Myocardial infarction | 100.0% | 100.0% | 100.0% |
| Total | age | 50 + | Count | 126 | 2709 | 2835 |
| | | | % within age | 4.4% | 95.6% | 100.0% |
| | | | % within Myocardial infarction | 81.8% | 44.5% | 45.4% |
| | | -49 | Count | 28 | 3380 | 3408 |
| | | | % within age | 0.8% | 99.2% | 100.0% |
| | | | % within Myocardial infarction | 18.2% | 55.5% | 54.6% |
| | | Total | Count | 154 | 6089 | 6243 |
| | | | % within age | 2.5% | 97.5% | 100.0% |
| | | | % within Myocardial infarction | 100.0% | 100.0% | 100.0% |

According to given data, in the case of obesity ( BMI >29.9), population above 50 years old have MI in anamnesis in 82.3% and below 50 in 17.7% cases ($X^2$=44.7; P<0.05) .
With the age, risk of MI development increases 4 times in obese population compared with normal weight population ( 95% CI 2.7- 6.6).

Table 8. Risk of diabetes mellitus in the case of overweight

| | | | Diabetes mellitus | | Total |
|---|---|---|---|---|---|
| | | | yes | no | |
| BMI overweight | 25-29.99 | Count | 164 | 451 | 615 |
| | | % within BMI overweight | 26.7% | 73.3% | 100.0% |
| | | % within Diabetes mellitus | 71.0% | 53.1% | 56.9% |
| | 18-24.99 | Count | 67 | 399 | 466 |
| | | % within BMI overweight | 14.4% | 85.6% | 100.0% |
| | | % within Diabetes mellitus | 29.0% | 46.9% | 43.1% |
| Total | | Count | 231 | 850 | 1081 |

According to this data in the case of overweight 71% of persons had diabetes mellitus in anamnesis while in normal weight population this number was 29% ($X^2$=23.8; P<0.05). overweight increases risk of diabetes mellitus development by 2.1 times ( 95% CI 1.6- 3.0).

Table 9. Risk of diabetes mellitus in the case of obesity

| | | | Diabetes mellitus | | Total |
|---|---|---|---|---|---|
| | | | yes | no | |
| BMI_obesity | 30 + | Count | 228 | 604 | 832 |
| | | % within BMI obesity | 27.4% | 72.6% | 100.0% |
| | | % within diabetes | 77.3% | 60.2% | 64.1% |
| | 18-24.99 | Count | 67 | 399 | 466 |
| | | % within BMI obesity | 14.4% | 85.6% | 100.0% |
| | | % within diabetes | 22.7% | 39.8% | 35.9% |
| Total | | Count | 295 | 1003 | 1298 |
| | | % within BMI obesity | 22.7% | 77.3% | 100.0% |
| | | % within diabetes | 100.0% | 100.0% | 100.0% |

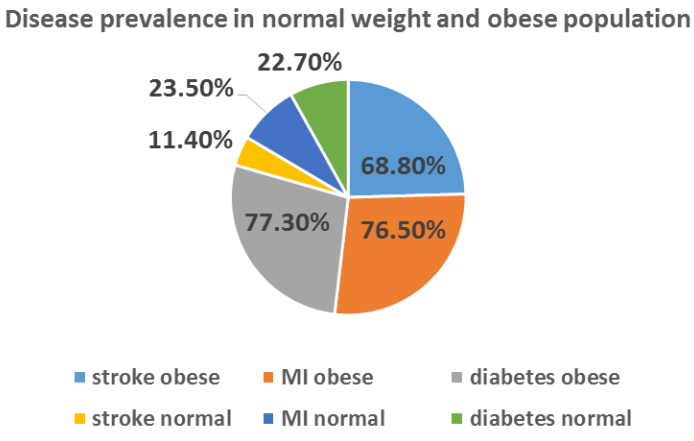
According to gained results, 77.3% of obese population experience diabetes mellitus in anamnesis while 22.7% of normal weight population indicates presence of diabetes mellitus ($X^2$=28.9; P<0.05). In obese population risk of diabetes development is 2.4 times higher compared with normal weight population ( 95% CI 1.7- 3.0).

According to the given data, in overweight and obese individuals above 50 years old indicate diabetes mellitus in anamnesis in 74.6% cases while below 50 have diabetes in 25.4% cases ($X^2$=7.3; P<0.05). With the age risk of diabetes development in overweight and obese individuals increase 1.6 times ( 95%CI 1.1- 2.2) .

Table 10. Risk of diabetes mellitus in overweight and obese population with increasing age

| BMI_overweight_obesity | | | Diabetes Mellitus | | Total |
|---|---|---|---|---|---|
| | | | yes | no | |
| 25 + | age | 50 + | Count | 170 | 391 | 561 |
| | | | % within age | 30.3% | 69.7% | 100.0% |
| | | | % within diabetes | 74.6% | 64.7% | 67.4% |
| | | -49 | Count | 58 | 213 | 271 |
| | | | % within age | 21.4% | 78.6% | 100.0% |
| | | | % within diabetes | 25.4% | 35.3% | 32.6% |
| | | Total | Count | 228 | 604 | 832 |
| | | | % within age | 27.4% | 72.6% | 100.0% |
| | | | % within diabetes | 100.0% | 100.0% | 100.0% |
| 18-24.99 | ????? | 50 + | Count | 50 | 163 | 213 |
| | | | % within age | 23.5% | 76.5% | 100.0% |
| | | | % within diabetes | 74.6% | 40.9% | 45.7% |
| | | -49 | Count | 17 | 236 | 253 |
| | | | % within age | 6.7% | 93.3% | 100.0% |
| | | | % within diabetes | 25.4% | 59.1% | 54.3% |
| | | Total | Count | 67 | 399 | 466 |
| | | | % within age | 14.4% | 85.6% | 100.0% |
| | | | % within diabetes | 100.0% | 100.0% | 100.0% |
| Total | ????? | 50 + | Count | 220 | 554 | 774 |
| | | | % within age | 28.4% | 71.6% | 100.0% |
| | | | % within diabetes | 74.6% | 55.2% | 59.6% |
| | | -49 | Count | 75 | 449 | 524 |
| | | | % within age | 14.3% | 85.7% | 100.0% |
| | | | % within diabetes | 25.4% | 44.8% | 40.4% |
| | | Total | Count | 295 | 1003 | 1298 |
| | | | % within age | 22.7% | 77.3% | 100.0% |

Illustration 5.

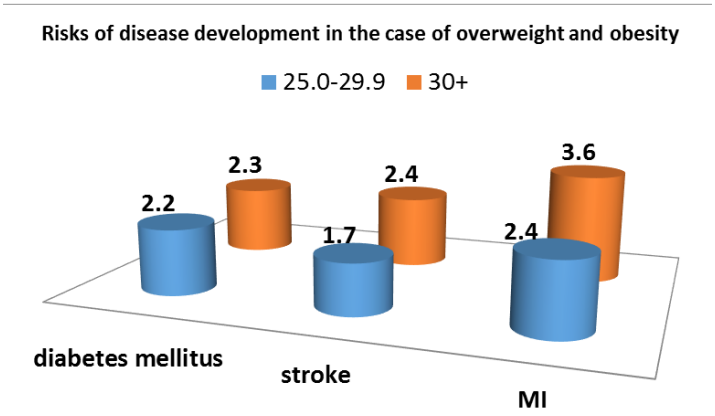



According to given data, In the case of overweight and obesity in population over 50 years old cancer is indicated in 69% cases while below 50 25.4% indicates disease in anamnesis ($X^2$=5.6; P<0.05). With the age risk of cancer development in overweight and obese population increases twice compared with normal weight population (95%CI 1.1- 3.4).

Table 11. Risk of cancer development with age in overweight and obese population

| BMI_overweight_obesity | | | cancer | | Total |
|---|---|---|---|---|---|
| | | | yes | no | |
| 25 + | age | 50 + | Count | 40 | 2133 | 2173 |
| | | | % within age | 1.8% | 98.2% | 100.0% |
| | | | % within cancer | 69.0% | 53.3% | 53.5% |
| | | -49 | Count | 18 | 1868 | 1886 |
| | | | % within age | 1.0% | 99.0% | 100.0% |
| | | | % within cancer | 31.0% | 46.7% | 46.5% |
| | | Total | Count | 58 | 4001 | 4059 |
| | | | % within age | 1.4% | 98.6% | 100.0% |
| | | | % within cancer | 100.0% | 100.0% | 100.0% |
| 18-24.99 | age | 50 + | Count | 12 | 650 | 662 |
| | | | % within age | 1.8% | 98.2% | 100.0% |
| | | | % within cancer | 50.0% | 30.1% | 30.3% |
| | | -49 | Count | 12 | 1510 | 1522 |
| | | | % within age | 0.8% | 99.2% | 100.0% |
| | | | % within cancer | 50.0% | 69.9% | 69.7% |
| | | Total | Count | 24 | 2160 | 2184 |
| | | | % within age | 1.1% | 98.9% | 100.0% |
| | | | % within cancer | 100.0% | 100.0% | 100.0% |
| Total | age | 50 + | Count | 52 | 2783 | 2835 |
| | | | % within age | 1.8% | 98.2% | 100.0% |
| | | | % within cancer | 63.4% | 45.2% | 45.4% |
| | | -49 | Count | 30 | 3378 | 3408 |
| | | | % within age | 0.9% | 99.1% | 100.0% |
| | | | % within cancer | 36.6% | 54.8% | 54.6% |
| | | Total | Count | 82 | 6161 | 6243 |
| | | | % within age | 1.3% | 98.7% | 100.0% |
| | | | % within cancer | 100.0% | 100.0% | 100.0% |

Illustration 6.




The above chart indicates disease prevalence in obese population compared with normal weight people. According to those results the disease prevalence is much higher in the case of obesity.

Overweight (BMI value 25- 29.9) increases risk of development of stroke for 1.7 times (95% CI 1-3.0).
in the case of obesity the risk is twice more compared with normal weight population (95% CI 1.4-4.0).

The risk of MI development increases 2.4 times in overweight population (95% CI 1.5-3.9), while for obese people OR is 3.6 (95% CI 2.3 -5.7).

The risk of diabetes mellitus increases with overweight for 2.2 times (95% CI 1.5-2.9) and in the case of obesity by 2.3 times (95% CI 1.7-3.0).

In the obese and overweight population above 50 years old risk of stroke increases 6 times, risk of MI increase 4 times, risk of diabetes mellitus increases 1.6 times compared with normal weight people.

According to the results maybe worked out useful recommendations. For the persons with high BMI it's recommended to make prophylactic examinations (screening) for above mentioned diseases.

**Conclusions:**

1. Increased BMI value is in relation with certain health conditions, such as high arterial pressure (t=3.4), high cholesterol level in blood ( t=-2.5), high blood glucose level ( t=6.4), stroke in anamnesis (t=-3.1), MI in anamnesis (t=-6.6), cancer in anamnesis (t=-6.3);
2. The risk of diabetes mellitus increases with overweight for 2.1 times and in the case of obesity for 2.2 times .
3. The risk of diabetes mellitus increases in obese population with age ( 50+), for 1.6 times;
4. Overweight increases risk of development of stroke for 1.7 times, obesity for 2.4 times; With the age ( 50+),obesity increases risk of stroke for 6 times;
5. The risk of MI development increases 2.4 times in overweight population and 3.6 times in obese population.
6. With the age ( 50+),obesity and overweight increase risk of MI for 4.2 times;
7. With the increase of age ( 50+), risk of cancer development increases twice in overweight and obese population.

**Recommendations:**

The study results outlined the necessity of practical recommendations that can be given based on current analyses:

1. In the case of presence of different diseases in the anamnesis ( MI, stroke, high blood pressure), population indicates high BMI index. Accordingly abnormal value of BMI at certain extent is the risk of developing of such diseases. For these purposes it's very important to recommend such patients weight control. This may allow them to avoid development of health risks.
2. It's important step to control blood level of glucose and cholesterol in the above mentioned cases. This may allow to identify and prevent certain diseases, such as diabetes mellitus and CHD at early stages.
3. Persons with high BMI value need to perform screening of diseases, such as diabetes, cancer, stroke, MI periodically.

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**Influence of Area of Residence on Contraception Use of Different Socio-Economic Characteristics Women in Georgia**

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**Summary**

**Aim:** The aim of our study was to determine area of residence (urban, rural) influence on overall contraception usage, including modern and traditional contraceptive methods in different groups of women distinctive by socio-economic characteristics: age, level of education, women material status, wealth tercile, number of living children and ethnicity.

**Methodology:** By secondary analysis of data of "Women Reproductive Health Survey 2010 in Georgia", with alternative statistical approaches and recoded variables association of predictor variables area of residence with dependent variables: use of modern or traditional methods of contraception were examined in selected women (n=2234, who currently used contraceptive methods) split into groups by age, level of education, ethnicity, wealth tercile, women material status and number of living children. Descriptive statistics methods and multivariate logistic regression analysis were done.

**Results:** Modern contraceptive methods were used by 1436 (64.3%) women in urban areas and by 798 (35.7%) women in rural areas. Women living in urban areas (n=1053) of 20-44 years, with higher level of education ($p<0.01$), lower wealth terciles ($p<0.05$), with low material status ($p<0.01$), along with 1, 2, 3 living children ($p<0.01$), with Georgian and Armenian ethnicity ($p<0.001$) compared to women living in rural areas (n=1181) were more likely to use modern methods of contraception. With no differences regarding the lowest level of education, the highest economic condition, 4 and more children, Azeri and others and 15-19 years age between women living in urban and rural areas.

**Conclusions:** It is very important, that healthcare providers take into the consideration identified in our study socio-economic factors, associated with low usage of modern contraception in rural areas and intensify informing and educated this target groups. This will increase use of high effective contraception and reduce the number of unintended pregnancies and induced abortion.

**Key words:** Use of contraception, residence, Georgia

**Problems statement:**

Use of contraception, especially modern and effective methods of contraception is significant determinant of unplanned pregnancy rate, which is often terminated by induced abortion or unwanted birth. This may affect sexual, reproductive and general health status of woman; result in serious mental and physical problems for her as well as her family (Barber, 1999). According to Women Reproductive Health Survey 2010 in Georgia unintended pregnancies constituted 36% of all pregnancies. Total induced abortion rate was 1.6 abortions per women. Contraception was currently used by 32% of all 15-44 years women and 53 % of married women, including 35% using modern methods in Georgia [Ross, 2010]. Since previous years use of contraception has been increased due to increased use of modern contraception from 20% in 1999 to 35% 2010, which reduced the number of unplanned pregnancies and induced abortions [Serbanescu, 2005; Serbanescu, 2001). Given trends can be explained by healthcare system reorganization and by the programs conducted by international organizations (United Nations Population Fund (UNFPA), United States Agency for International Development (USAID), United Nations Children's Fund (UNICEF)) since 2000, leading to improvement of sexual/reproductive health indicators, including usage of modern methods of contraception in Georgia ("UNFPA Georgia", 2016, "USAID", 2014, Ross,2012). However, these indicators are unfavorable, as the rate of unintended pregnancies and induced abortion are still high. Subsequent analysis of 1999 and 2005 Reproductive Health Surveys findings showed that non-use of contraception was the major determinant of the rate of induced abortions, and use of modern contraception significantly reduced the number of unplanned pregnancies (Serbanescu, 2010).

As surveys, conducted in other countries in the world, showed women socio-economic characteristics: area of residence, age, level of education, ethnicity, number of living children, women economic condition with other factors have influenced on contraception use, it is very interesting to examine these factors influence on use of methods of contraception, particularly of use of modern, effective contraception in Georgia (Daniels, 2014, Mekonnen,2011, Palamuleni, 2013).

In Georgia there are compact settlements of population of different religion and ethnicity. Population in urban and rural areas has different views and tradition, different accessibility to education, including been informed about modern methods of contraception (Ethnoses in Georgia, 2008).

In order to identify high-risk women and provide implementation of appropriate preventive measures through increase of informing and knowledge of population and increase of accessibility, it is essential for health care system

providers and physicians to know the risk factors associated with non use of modern contraceptive methods for instance, the area of residence. Because of the changes in their effects could lead to an improvement in the contraceptive use over time (Ulrich, 2001).

Based on all above mentioned **objective** of our study was to determine predictor variables- area of residence (urban, rural) influence on dependent variables - overall contraception usage, including modern and traditional contraceptive methods use in different groups of women distinctive by socio-economic characteristics: age, level of education, women material status, wealth tercile, number of living children and ethnicity.

**Methodology**

Secondary analysis of database of 2010 Reproductive Health Survey was performed. Cross-sectional study, using stratified multistage sampling method was conducted from October 2010 through February 2011, with approval of the ethics committee of National Center for disease Control of Georgia. After obtaining informed consent, 6292 women regardless of marital status, living in Georgia during the survey period (excluding separatist regions of Abkhazia and South Ossetia), were interviewed at their homes**.** Inclusion criterion was age of 15 and 44 year. For our study, inclusion criterion was, women who were currently used modern or traditional methods of contraception. In addition of this for each statistical analysis inclusion criteria were different and were included women with the same characteristics, in which field were they examined. Women were categorized into groups according to age: 15-19, 20-24, 25 -29, 30-34, 35-39, 40-44 years, Level of education: Incomplete secondary, secondary, technicum, diploma/ postgraduate, ethnicity: Georgian, Azeri, Armenian and other, women material status: Can hardly satisfy their needs, can somehow satisfy their needs, can easily satisfy their needs, wealth tercile: low, middle, low and number of living children: 0,1,2,3,4 and more. Anyone outside these groups was excluded from the analysis.

The survey helped to obtain the data about basic characteristics and health indicators of population. Based on the responses received through the survey dependent variable has been selected: Currently use of contraception. Women were categorized into those using a modern method of contraception and those using a traditional method of contraception. Modern methods of contraception included use of the pill, intra-uterine device (IUD), condom plus IUD, condom plus traditional method of contraception, spermicides, or injectables, while traditional methods of contraception included use of calendar/rhythm method, withdrawal and calendar plus withdrawal.

In our study the factors potentially associated with use of contraception, identified as predictor variables was area of residence: which was categorized into those living in urban areas and those living in rural areas.

Data were analyzed using the statistical software SPSS version 17. Descriptive statistics and multinomial logistic regression were used. Multinomial logistic regression was done to calculate odds ratios (ORs) for use of each method of contraception for area of residence separately in selected groups of women splitting by age, level of education, ethnicity, material status, wealth tercile, number of living children.

**Results**

Average age of women involved in the survey was 29.5 (SD=8.1; range=15-44). 2234 respondents reported to currently use modern or traditional methods of contraception with mean age 32.33 (SD=6.37). Majority were ethnically Georgian women. 40.6% had university/post-graduate education; 1181 (52.9%) women lived in rural areas (Table 1). Modern contraceptive methods were used by 1436 (64.3%) women in urban areas and by 798 (35.7%) women in rural areas. After conducting Multinomial logistic regression in different groups of selected women, statistical analysis showed that women living in urban areas compared to women living in rural areas were more likely to use modern methods of contraception or regarding use of modern and traditional methods of contraception in urban and rural areas significant difference was not found (Table 2).

Women of 20-24, 25-29, 30-34, 35-39, 40-44 age groups living in urban areas were more likely to use modern contraceptive methods ($p<0.05$). Exception was 15-19 years age group, which did not show statistically significant difference regarding modern and traditional methods use in urban and rural areas ($p<0.05$).

Regarding education it was established, that in groups of women with the lower levels of education modern contraceptive methods use was associated with living in urban areas ($p<0.01$), while women with the highest level of education did not show statistically significant difference by usage of modern methods of contraception regarding residence ($p>0.05$).

Statistical analysis, conducted in selected groups split by ethnicity showed that only women of Georgian and Armenian ethnicity living in urban areas were more likely to use modern methods of contraception compared to women with same ethnicity living in rural areas. Azeri and women with other ethnicity were not differently used contraceptive methods regarding residence.

Women with the highest wealth tercile and women who can easily satisfy their needs were equally used modern contraception in urban and rural areas. On the contrary, women in low and middle tercile and who can hardly or somehow satisfy their needs were more likely to use modern contraception in urban areas ($p<0.05$).

Table 1. Background characteristics of study sample (Total n=2234)

| | | | Use of modern methods of contraception N (%) | Use of traditional methods of contraception N (%) | Total N (%) |
|---|---|---|---|---|---|
| **Age** | 15-19 | Urban | 6(30.0) | 2 (28.6) | 8 (29.6) |
| | | Rural | 14 (70.0) | 5 (71.4) | 19 (70.4) |
| | 20-24 | Urban | 107 (55.7) | 22 (27.2) | 129 (47.3) |
| | | Rural | 85 (44.3) | 59 (72.8) | 144 (52.7) |
| | 25-29 | Urban | 174 (51.9) | 45(33.1) | 219(46.5) |
| | | Rural | 161(48.1) | 91 (66.9) | 252 (53.5) |
| | 30-34 | Urban | 196 (53.8) | 80 (36.0) | 276 (47.1) |
| | | Rural | 168 (46.2) | 142 (64.0) | 310(52.9) |
| | 35-39 | Urban | 177 (56.9) | 71 (36.8) | 248 (49.2) |
| | | Rural | 134 (43.1) | 122 (63.2) | 256 (50.8) |
| | 40-44 | Urban | 110 (51.4) | 63 (39.6) | 173 (46.4) |
| | | Rural | 104 (48.6) | 96 (60.4) | 200 (53.6) |
| **Education** | Incomplete secondary | Urban | 51 (25.2) | 30 (17.8) | 81 (21.8) |
| | | Rural | 151 (74.8) | 139(82.2) | 290 (78.2) |
| | Secondary | Urban | 114 (40.6) | 56 (26.2) | 170 (34.3) |
| | | Rural | 167 (59.4) | 158 (73.8) | 325 (65.7) |
| | Technicum | Urban | 148 (50.0) | 58 (34.9) | 206 (44.6) |
| | | Rural | 148 (50.0) | 108 (65.1) | 256 (56.4) |
| | Diploma/ Postgraduate | Urban | 457 (69.6) | 139 (55.8) | 596 (65.8) |
| | | Rural | 200 (30.4) | 110 (44.2) | 310 (34.2) |
| **Ethnicity** | Other | Urban | 23 (63.5) | 7 (46.7) | 30 (51.7) |
| | | Rural | 20 (46.5) | 8 (53.3) | 28 (48.3) |
| | Armenian | Urban | 28 (60.9) | 16 (18.6) | 44 (33.3) |
| | | Rural | 18 (39.1) | 70 (81.4) | 88 (66.7) |
| | Azeri | Urban | 8 (15.4) | 7 (15.2) | 15 (15.3) |
| | | Rural | 44 (84.6) | 39 (84.8) | 83 (84.7) |
| | Georgian | Urban | 711 (54.9) | 253 (38.9) | 964 (49.5) |
| | | Rural | 584 (45.1) | 398 (61.1) | 982 (50.5) |
| **Material status** | Can hardly satisfy their needs | Urban | 111 (35.8) | 67 (24.0) | 170 (30.2) |
| | | Rural | 199 (64.2) | 212 (76.0) | 411 (69.8) |
| | Can somehow satisfy their needs | Urban | 587 (57.2) | 199 (40.0) | 796 (51.5) |
| | | Rural | 440 (42.8) | 299 (60.0) | 739 (48.5) |
| | Can easily satisfy their needs | Urban | 721 (72.7) | 17 (81.0) | 89 (74.2) |
| | | Rural | 27 (27.3) | 4 (19.0) | 31 (25.8) |
| **Wealth tercile** | High | Urban | 528 (95.35) | 170 (97.1) | 698 (95.9) |
| | | Rural | 25 (4.5) | 5 (2.9) | 30 (4.1) |
| | Middle | Urban | 200 (39.2) | 92 (29.8) | 292 (35.7) |
| | | Rural | 310 (60.8) | 217 (70.2) | 527 (64.3) |
| | Low | Urban | 42 (11.3) | 21 (6.7) | 63 (9.2) |
| | | Rural | 331 (88.7) | 293 (93.3) | 924 (90.8) |
| **Number of living children** | 0 | Urban | 20 (76.9) | 2 (40.0) | 22 (71.0) |
| | | Rural | 6 (20.1) | 3 (60.0) | 9 (29.0) |
| | 1 | Urban | 228 (60.6) | 75 (46.6) | 303 (56.4) |
| | | Rural | 148 (39.4) | 86 (59.4) | 234(43.6) |
| | 2 | Urban | 436 (54.0) | 166 (35.1) | 602 (47.0) |
| | | Rural | 371 (46.0) | 307 (64.9) | 677 (53.0) |
| | 3 | Urban | 77 (40.1) | 31 (23.5) | 108 (33.3) |
| | | Rural | 115 (59.9) | 101 (76.5) | 216 (66.7) |
| | 4 | Urban | 9 (25.7) | 9 (33.3) | 18 (29.0) |
| | | Rural | 26 (74.3) | 18(66.7) | 44 (61.0) |

Table 2. OR of use of modern and traditional contraceptive methods by urban and rural areas

| | | OR95%CI |
|---|---|---|
| Age | 15-19 | ns |
| | 20-24 | 3.376 (1.916-5.948)*** |
| | 25-29 | 2.186 (1.441-3.315)*** |
| | 30-34 | 2.071 (1.470-2.918)*** |
| | 35-39 | 2.270 (1.570-3.282)*** |
| | 40-44 | 1.612 (1.063-2.443)* |
| Education | Incomplete secondary | ns |
| | Secondary | 1.926 (1.308-2.836)** |
| | Technicum | 1.862 (1.258-2.756)** |
| | Diploma/Postgraduate | 1.808 (1.339-2.442)*** |
| Ethnicity | Other | ns |
| | Armenian | 6.806 (3.047-15.199)*** |
| | Azeri | ns |
| | Georgian | 1.915 (1.581-2.320)*** |
| Material status | Can hardly satisfy their needs | 1.765 (1.232-2.529)** |
| | Can somehow satisfy their needs | 2.004 (1.612-2.492)*** |
| | Can easily satisfy their needs | ns |
| Wealth tercile | High | ns |
| | Middle | 1,522 (1.125-2.058)** |
| | Low | 1.770 (1.025-3.059)* |
| Number of living children | 0 | ns |
| | 1 | 1.766 (1.217-2.564)** |
| | 2 | 2.173 (1.720-2.747)*** |
| | 3 | 2.181 (1.329-3.580)** |
| | 4 | ns |

The reference category is use of traditional methods of contraception.
*** ($p<0.001$), ** ($p<0.01$), * ($p<0.05$), ns $p>0.05$ not significant

Modern contraception were more likely used in urban areas compared to women living in rural areas by women having 1,2,3 living children ($p<0.01$), while having 0 or more then 4 child did not show statistical significant difference.

**Discussion**

Our Study shows, that like other countries, socio-economic and demographic characteristics of women have influence on contraceptives, particularly modern contraceptive methods use (Achana, 2015, Khan, 2012, Oddens, 1997). Particularly, living area could have an impact on contraception use. As the women living in urban areas have more opportunity to be more informing and acquiring more knowledge about modern contraceptive methods, have more accessibility to healthcare facilities and pharmacies. As it was established in our study women living in urban areas more frequently used modern methods of contraception, except several groups showed equally usage of modern and traditional methods of contraception.

In lower age group (15-19 year) women living in urban areas and living in rural areas did not differently used modern methods of contraception. This finding could be explained by the behavior regarding pregnancy intention in Georgia. Due to tradition of each countries women attitude to pregnancy planning is different regarding age. For example, in India newly married women may be willing to postpone their first pregnancy but they may be constrained to take specific action because of the family and social

pressure to prove their fertility (Khaurasia, 2014). Young Europeans may not feel the same social pressure to get married and have children as did their parents and grandparents. Europe's low fertility has also been linked to the so -called "contraceptive revolution" (Worku, 2014).

In Georgia young women begin sexual life mainly after marriage and want to become pregnant and have a child very soon. Therefore most of pregnancies in younger age are intended and consequently there is a less demands of use of contraception (Daniels, 2014). Like this, frequently woman with 0 living child, wanted to get pregnant, had no needs to prevent pregnancy and less used contraception, therefore statistical analysis did not show difference regarding residence of modern and traditional contraception use in this group. Contrary, women with 4 and more children are strongly motivated to prevent unintended pregnancies. So, villagers used modern methods of contraception equally high to citizens. In Georgia fertility rate is low 2.0 births per woman, in our data analysis women with 4or more living children included only a few cases, this might affect results of statistical analysis.

According to surveys, conducted in many other countries level of education has a significant influence on contraception use [Bbaale, 2011, Font-Ribera, 2008, Nur, 2012, Saleem, 2005, Yago, 2014, Yousef, 2002). In our study level of education has a clear impact on modern contraception use by women. Women with higher level of education (incomplete secondary, secondary and „technicum“) statistically significantly were more likely to use modern contraception in urban areas. But examining women with the lowest level of education revealed that educated women living in rural areas equally to women living in urban areas used modern methods of contraception. Thus, impact on modern contraception use in rural areas has only high level of education. Intension to avoid unwilling pregnancy motivates her to search for and use safe and highly effective methods of contraception. They have high probability to acquire knowledge about sexual health, providing them with more autonomy and ability to make a decision regardless area of residence.

High accessibility to healthcare services and high mobility explains equally use of modern contraceptive methods in urban and rural areas by women in the highest wealth tercile and who can easy satisfy their need. While women in low and middle tercile and who can hardly or somehow satisfy their needs frequently are without these opportunities.

Armenian women living in rural places have a high risk of not using modern contraception, they traditionally use withdrawal (Armenian demographic and health survey, 2010). This fact demands attention of healthcare providers to intensify work with this population.

**Conclusions**

Thus, our study ascertained that women living in urban areas compared to women living in rural areas were more likely to use modern methods of contraception. Women of almost all age groups, lower level of education, lower wealth terciles and low material status, with 1,2, 3 living children, Georgian and Armenian ethnicity were more likely to use modern methods of contraception in urban areas. Thus, women living in rural areas are in high risk of low use of modern contraception. It is important, that health care providers will take into consideration factors identified in our study and intensify work with those target groups in rural areas: women of 15-19 years, lower level of education, lower economic condition, with 1,2, 3 living children, Georgian and Armenian ethnicity, by the improvement of the knowledge about contraception, especially its modern methods, increasing accessibility to these methods and their use, help women to make well informed decision about high effective contraceptive choice. That, in turn, will reduce the number of unintended pregnancies and associated induced abortions with direct participation of health care providers.

**Acknowledgments**

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# Pregnant Nutrition and Influence to Infant Health Condition

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**Summary**

A goal of the following research is to study nutrition status in pregnant women and to link it to new-born and mother's health status. During the research nutrition questionnaire has been made. The questions were about nutrition status and also about risk factors that had influence maternal and infant health status. The research group was consisting of 100 pregnant women. The number of participators was calculated by a sample size proportion. According to the research outcomes following opinions had set: Body mass index (BMI) was high level in 64% of mothers. 25% of newborns have low birth weight (below 2800 grams) and 23% high birth weight (high 3900 grams). A different kind of anemia was shown in the 38% of mothers and 41% of new-born. 50% of pregnant women had a lack of milk, 51% a milk food, 50% a beef, 52% a chicken, 30% a fruit, 9% vegetables and green deficit in daily nutrition status. 26% of pregnant women had a deficit of calories, 34% had the deficit of protein, and 36% had the deficit of carbohydrate. 7-7% of pregnant women are using alcohol and cigarettes.

***Abbreviations:*** WHO – World Health Organization , SPSS – Statistical Package for the Social Sciences; OR – Odds Ratio, RR – Relative Risk, 95% CI – 95% Confidence Interval, *BMI- Body Mass Index.*

***Key words:*** *Nutrition status, Risk-factors, Hemoglobin, Body Mass Index.*

## Introduction

Proper nutrition is fundamental to human health. The food, which we accept, boosts the body's tissues and cells as development, as well as their regular updating. The food is a source of energy that our organism spends not only exercise, but also during the rest time.

Healthy food is a plant or animal products, which provides the necessary nutritive substances and energy in order to maintain growth and health (The US Department of Agriculture, 2014).

According to US food and drug agency- healthy foods are: If it is less fat; 2. If it contains the minimum number of salt and cholesterol; 3. Provides the following one of them with at least 10 percent of the vitamin A, vitamin C, calcium and proteins (Healthy eating plate, 2015).

Maternal and child health are two main components of Millennium Development Goals (WHO report, 2010).

In the development countries pregnancy and delivery complications is one of the main reasons of mortality and morbidity of women. According to the WHO maternal and infant mortality rate is very high in the world. In 2008 358,000 maternal mortality cases were described which is less than cases described in 1990 – 546,000.

According to the WHO every year 8.8 million children die before the age of 5. Including 3.8 million cases from this is shown during neo-natal period (from birth to 28 days), 1.8 million is during postnatal period (till 1 year), and 3.2 million during 1-5 years (WHO report, 2005).

Since 2010 ministry of labour health and social affairs of Georgia launched maternal and infant health program. This program includes the provision of a safe pregnancy process, complicated delivery management, decrease of perinatal mortality, high quality consultations of pregnant women, early detection of genetic diseases and birth defects. The program includes: antenatal care, early detection of genetic abnormalities, high- risk pregnant and maternal treatment, screening of newborns and children hypothyroidism and phenylketonuria. The proper management of pregnancy and fetal development is necessary for the proper and adequate nutrition.

During all three trimester of pregnancy nutrients should be correctly selected and planed. It is necessary to take into account the following factors:

- ◊ Adequate fetal growth and development of the basic physiological needs nutrients and energy;
- ◊ Pregnant women physiological fluid and energy to satisfy the demand of basic food in all three trimesters of their health and work to maintain.
- ◊ During all three trimester of pregnancy active, positive and comfortable environments ensuring self-esteem.

It is important to build an Embryo and then the fetus with 'building protein', which is the lack of a variety of nutrients; as well as excess it can be undesirable consequences. Full fetal development adversely affects the following factors:

1. The energy and protein deficiency;
2. Ω3 Ω6 deficiency or imbalance between them;
3. A vitamin deficiency and abundance;
4. Deficit of folic acid, zinc, and iodine (Mikeladze M., and others, 2015).

Energy and protein deficiency in pregnant women and the fetus food diet' leads to growth retardation and infant malnutrition. Protein deficiency in pregnant women should have a strong place that affect fetal development, because the slightest failure of the fruit still gets the required amount of energy and protein, protein reserves from the mother's depot.

Polyunsaturated fatty acids depends myelin membrane development, which plays the main role of the nervous system and the functioning of the calculated formulation. A classic example of the lack of nutrients caused by a deficiency of folic acid and zinc is fetal neural tube defects (hereinafter anencephaly spinal cord and brain hernia), congenital heart disease.

An embryonic development of the neural tube to close during the early period (28 days after conception), so it's important that women take folic acid until the pregnancy. A vitamin deficiency or the excess may cause fetal malformations. Because of this in US in recent years reduced the daily dose of vitamin A 0.8 mg / day. Great importance is given to pregnant women with calcium and iron-rich diet.
Calcium deficiency of the mother from the depot bodies (bones, teeth) becomes endogenic calcium mobilization, which is the foundation of pregnant women osteoporosis and tooth decay. Normal fetal growth and development is necessary for the mother's diet rich in animal protein, vitamins and microelements.

An adequate intake of essential nutrients pregnant women physiological needs. Pregnancy in the first trimester of the mother's diet should be varied, rich in vitamins and trace elements. It should be noted that exactly the first trimester pregnant women include changes in the tastes of foods and food intolerance are more common, which require particular attention from the doctor (National nutrition strategy, 2015).

**Methodology**

The survey included several components. The method of research was quantitative. In the process there were predeveloped food questionnaires for pregnant women. The questionnaire covered the food and risk -factors, which had a significant impact on maternal and child health.

For the exclusion of compounders also include other important questions about the additional risk factors, such as tobacco and alcohol consumption.

Pregnant women about the data collection were carried out retrospectively specifically composed of pregnant women's means.

Additional retrospectively studied the nutritional status of women in the nursing mother's nursing questionnaire, alsochildbirth complications, any mothers and babies health condition and results of laboratory studies, implying that the mother and the newborn hemoglobin levels.

The nutrients had been processed using a special program that calculates the nutritional products and micronutrient macronutrient number.

The results obtained have been processed by the computer program SPSS. Cross - sectional epidemiological analysis was conducted in two groups.

The research group was consisting of 100 pregnant women. The number of participators was calculated by a sample size proportion.

The selection criteria were not randomized. Pregnant women were selected in consultation with a wide base. At the same time has been used and the sample is easily accessible on the web application, which will allow pregnant women to fill out a questionnaire online.

For pregnant women the necessary nutrients and energy are some of the modern approach to the table (Mikeladze M., and others, 2015).

**Results**

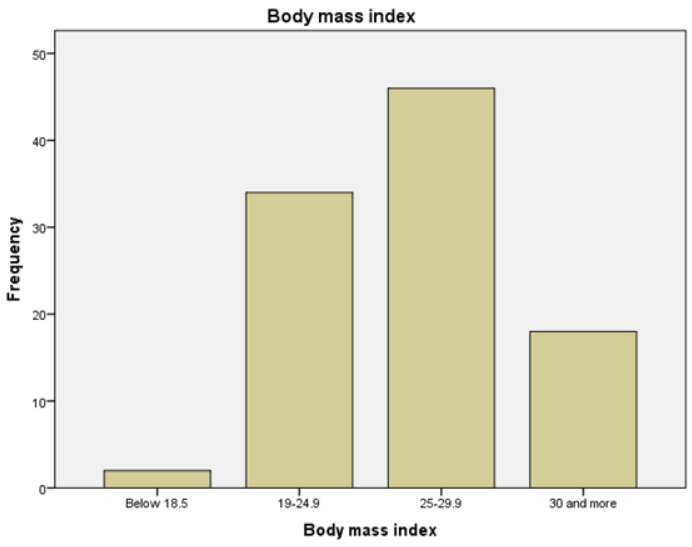
17% of pregnant women had moderate anemia, 21% had mild anemia and 62% has standard ratio of hemoglobin in blood.

19% of infant had moderate anemia, 22% had mild anemia and 59% has standard ratio of hemoglobin in blood.

10% of infants had 2000 g birth weight, 15% weight was between 2100-2800 grams, 52% weight was between 2900 -3800 grams and 23% was more than 3900 grams.

A body mass index of the pregnant women was following: 2% had weight deficit, 34% had normal balance, 46% were overweight and 18% was obese.

Diagram 1




16% of pregnant women were drinking milk 3 times a month, 34% did this once a week, 23% 2-4 times a week, 27% approximately every day.

Table 1

| Macro or micronutrients | Basic needs for women from 18-29 | Addi-tional require-ment for pregnant women |
|---|---|---|
| Energy, k/Cal | 2200 | 350 |
| Protein, grams | 66<br>33 | 30<br>20 |
| Percent (%) from k/Cal | 12 | |
| Fetus, grams | 73 | 12 |
| Fetus, (%) from k/Cal | 30 | |
| Unsaturated fat (%) from k/Cal | 10 | |
| Polyunsaturated fat (%) from k/Cal | 6-10 | |
| Omega-6 (%) from k/Cal | 5-8 | |
| Omega-3 (%) from k/Cal | 1-2 | |
| Phospholipids, grams | 5-7 | |
| Carbohydrates, grams | 318 | 30 |
| Sugar (%) from k/Cal | <10 | |
| Dietary fiber, grams | 20 | |
| Vitamin C, mg | 90 | 10 |
| Vitamin B1, mg | 1, 5 | 0, 2 |
| Vitamin B2, mg | 1, 8 | 0, 2 |
| Vitamin B6, mg | 2, 0 | 0, 3 |
| Niacin, mg | 20 | 2 |
| Vitamin B12, mcg | 3, 0 | 0, 5 |
| Folate, mcg | 400 | 200 |
| Pantothenic acid | 5, 0 | 1, 0 |
| Biotin, mcg | 50 | |
| Vitamin A mcg | 900 | 100 |
| Beta-carotene, mg | 5, 0 | |
| Vitamin E | 15 | 2 |
| Vitamin D, mcg | 10 | 2, 5 |
| Vitamin K, mcg | 120 | |
| Calcium, mcg | 1000 | 300 |
| Phosphor, mg | 800 | 200 |
| Magnum, mg | 400 | 50 |
| Potassium, mg | 2500 | |
| Sodium, mg | 1300 | |
| Chlorine, mg | 2300 | |
| Ferum, mg | 18 | 15 |
| Zinc, mg | 12 | 3 |
| Iodine, mg | 150 | 70 |
| Copper, mg | 1, 0 | 0, 1 |
| Manganese, mg | 2, 0 | 0, 2 |
| Chromium, mcg | 50 | |
| Selenium, mcg | 55 | 10 |
| Molybdenum, mcg | 70 | |
| Fluorine, mg | 4, 0 | |

Table 2. Pregnant Hemoglobin

| | | Fre-quency | Per-cent | Valid Percent | Cumula-tive Per-cent |
|---|---|---|---|---|---|
| Valid | 100 g/l | 17 | 17.0 | 17.0 | 17.0 |
| | 101-119 g/l | 21 | 21.0 | 21.0 | 38.0 |
| | 120 g/l and more | 62 | 62.0 | 62.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

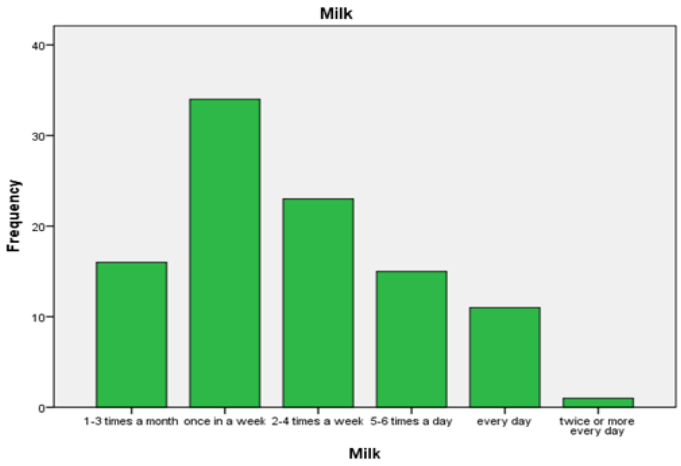
Table 3. Infant Hemoglobin

| | | Fre-quency | Per-cent | Valid Percent | Cumula-tive Per-cent |
|---|---|---|---|---|---|
| Valid | 100 g/l | 19 | 19.0 | 19.0 | 19.0 |
| | 101-119 g/l | 22 | 22.0 | 22.0 | 41.0 |
| | 120 g/l and more | 59 | 59.0 | 59.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

Table 4. Infant weight

| | | Fre-quency | Per-cent | Valid Percent | Cumula-tive Percent |
|---|---|---|---|---|---|
| Valid | 2000 grams | 10 | 10.0 | 10.0 | 10.0 |
| | 2100-2800 grams | 15 | 15.0 | 15.0 | 25.0 |
| | 2900-3800 grams | 52 | 52.0 | 52.0 | 77.0 |
| | 3900 grams and more | 23 | 23.0 | 23.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

Diagram 2



16% of pregnant women were drinking milk 3 times a month, 34% did this once a week, 23% 2-4 times a week, 27% approximately every day.

6% of pregnant women were eating milk products 3 times a month, 16% did this once a week, 29% 2-4 times a week and 49% approximately every day.

10% of pregnant women were eating beef 3 times a month, 40% did this once a week, 30% 2-4 times a week and10% approximately every day.

7% of pregnant women were eating fruit 3 times a month, 23% did this once a week, 34% 2-4 times a week and 36% approximately every day.

Diagram 3


9% of pregnant women were eating vegetables and green 3 times a month, 30% did this once a week and 61% approximately every day.

14% of pregnant women never drank soft drink, 31% did it 3 times a month, 36% did this once a week and 19% 2-4 times a week.

72% of cases were natural childbirth cases and 28% was caesarean section.

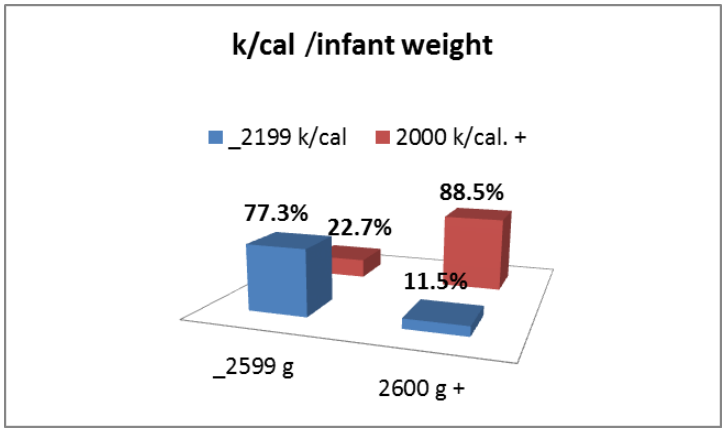
In 85% of infant cases were shown breastfeeding, in 12% mixed feeding and in 3% were shown non-natural feeding. 7-7% of pregnant women were using alcohol and cigarettes.

During this research 7 cases were shown with Aspasia, 3 cases with infant heart diseases, 1 with spina bifida and 1 with infection.

Pregnant women in the daily diet of calorie low number (2200 k /cal) the incidence of 65.4% of a low birth weight (2600 g), while the daily food ration for a caloric normal number (2600 k /cal, and more) 93.2% of cases were registered in infants of normal weight (2600 and up). It should be noted that the incidence of low birth weight of 77.3% of pregnant women in the diet was low in calories ($X^2$= 38.5; P <0.01).

Of pregnant women received a low- calorie the odds ratio (OR) is 26.1 times higher to infants born with low weight. (OR = 26.1; 95% CI = 7.7 - 87.9), the relative risk (RR) indicator - 9.7 times (RR = 9.7; 95% CI = 4.0 -23.6).

Diagram 4

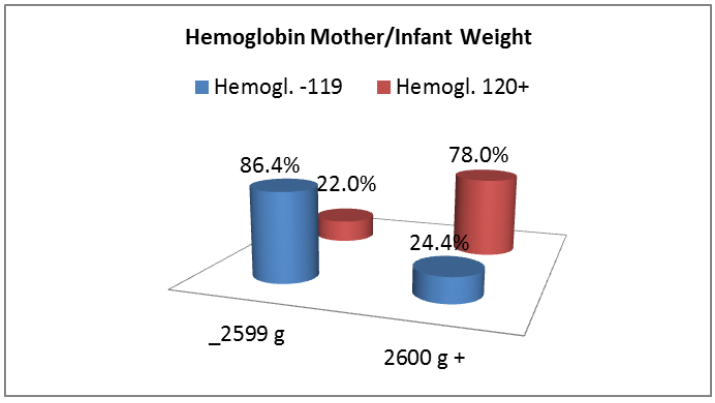



Pregnant women in the daily diet of protein low number (65 g) 47.1% cases were to place a low birth weight (2600 g), while the daily food ration of proteins in normal number (66 g or more), 90.9% was incidence of the registered infants with normal weight (2600 and up).

It should be noted that the incidence of low birth weight of 72.7% of pregnant women in the diet was low in protein ($X^2$= 18.9; P <0.01). Of pregnant women received low amounts of protein in your daily diet by making the odds ratio (OR) by 8.9-fold higher for infants born with low weight (OR = 8.9; 95% CI = 3.0 - 26.1), the relative risk (RR) indicator - 5.2 times (RR = 5.2; 95% CI = 2.2-12.0).

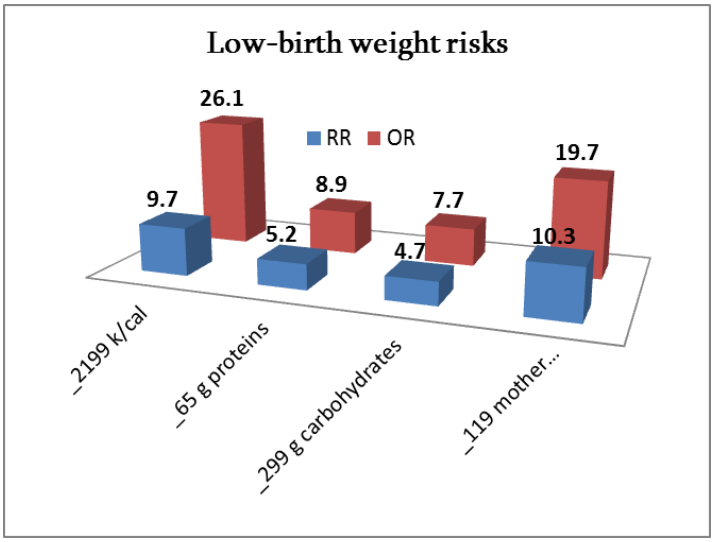
Pregnant women in the daily diet, a low amount of carbohydrate (300 g) containing the incidence of 44.4% of a low birth weight (2600 g), while the daily diet of carbohydrate normal number (300 g or more), the incidence of 90.6% - was registered as a normal birth weight (2600 and up).

Diagram 5




Thus the trend of infants with low birth-weight risk is following:

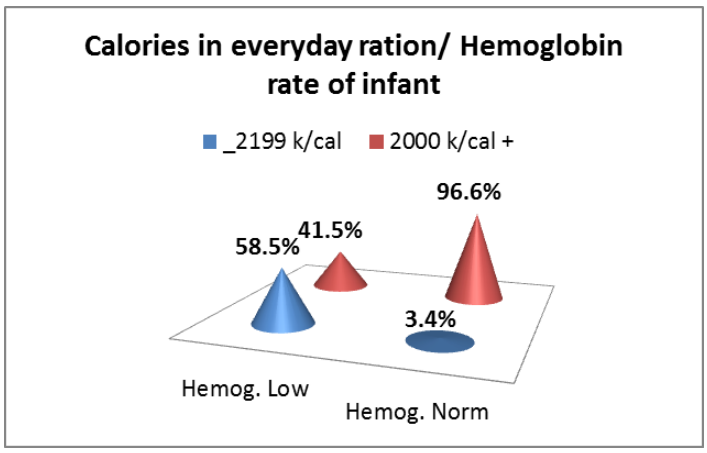
Diagram 6




High- weight infants (4000 g or more) 94.7 % in case of pregnant women received daily food ration of high protein. While normal-weight infants (3900 g or less) 81 % in case of normal proteins points ($X^2 = 8.6$; $P < 0.01$).

The high amounts of protein in your daily diet of pregnant women the odds ratio (OR) for infants born with high weight 12.4 times higher (OR = 12.4; 95% CI = 1.6 - 92.7), the relative risk (RR) indicator - 9.3 times higher (RR = 9.3; 95% CI = 1.3 -66.5).

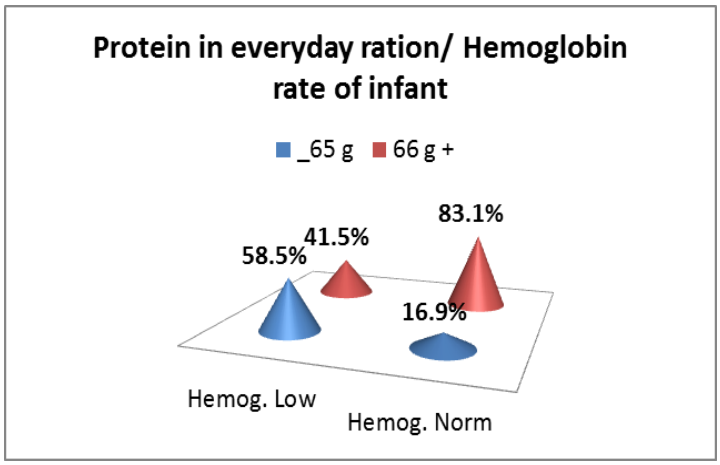
Diagram 7




Low amounts of protein in the diet of pregnant women 70.6 % cases were descripted infant with low hemoglobin (120 or less). Whereas, normal amounts of protein in the diet of pregnant women 74.2 % cases were descripted normal newborn hemoglobin (120 and more) ($X^2 = 18.6$; $P < 0.01$).

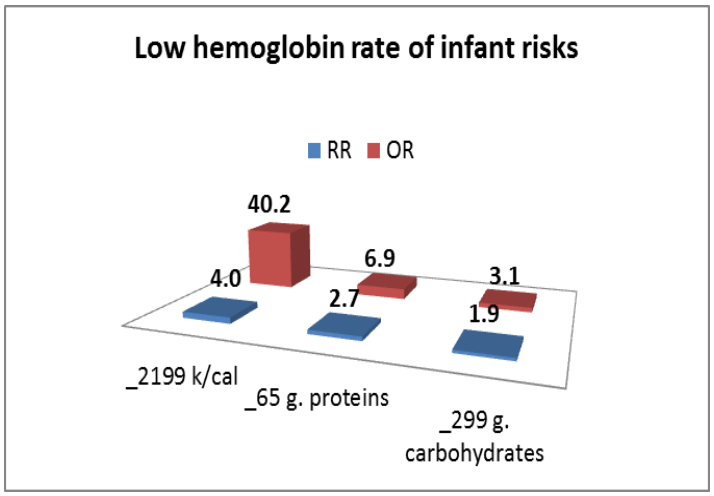
Low amounts of carbohydrates in the diet of pregnant women is shown 58.3 % of case of an infant with low hemoglobin (120 or less). Whereas, normal amounts of carbohydrates in the diet of pregnant women shows 74.6 % case of normal newborn hemoglobin (120 and more) ($X^2 = 7.0$; $P < 0.01$).

Diagram 8



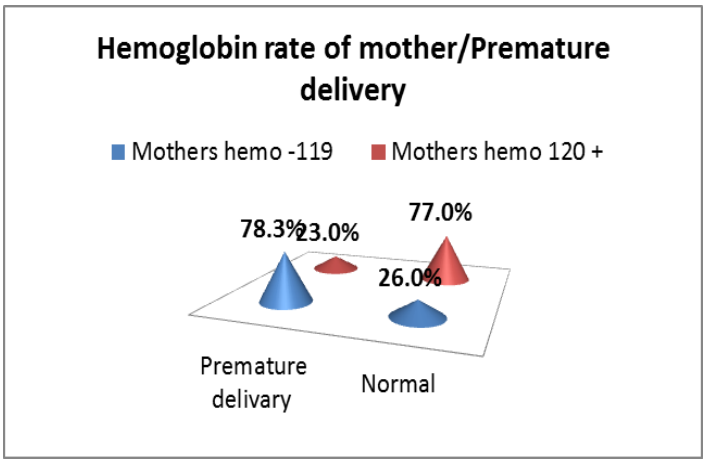

The number of infants born with low blood hemoglobin risk trend was following:

Diagram 9



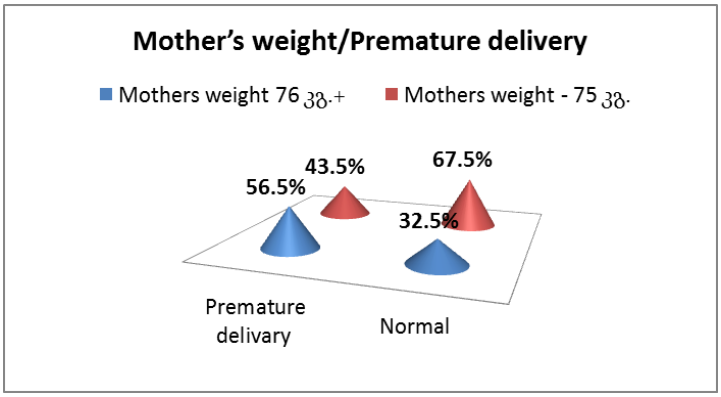

In 78.3 % of premature births, pregnant women were faced low blood hemoglobin level (120 or less). Whereas, in 77% cases of timely delivery, pregnant women had normal hemoglobin level (120 and more) ($X^2=20.6$; $P < 0.01$).

Diagram 10



In 56.5% of premature births of pregnant women were faced a high weight (76 and over). While in 67.5% were timely deliveries in case of normal weight (75 or less) ($X^2$ = 4.3; P <0.05).

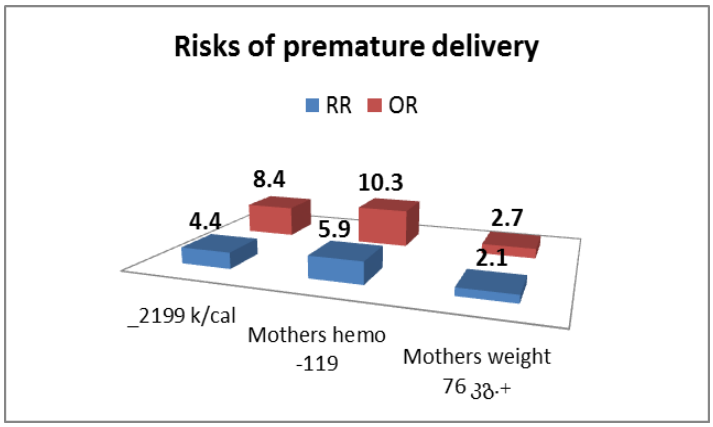
Diagram 11




In 60.9% of premature births pregnant women were faced a low number of calories in the diet. While in case of 84.4% timely deliveries, normal number of calories in the diet was shown ($X^2$ = 18.9; P <0.01). Of pregnant women with low calories in the diet odds ratio parameter (OR) for premature birth was 8.4-times higher (OR = 3.0; 95% CI = 3.0 - 23.8), and the relative risk (RR) indicator - 4.4 times higher (RR = 4.4; 95% CI = 2.2 - 9.0).

Thus the risk trend of premature delivery was as following:

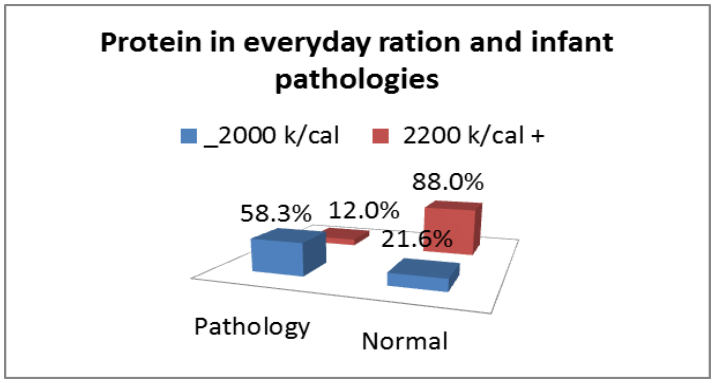
Diagram 12




In case of 22.9 % low number of calories in daily diet newborn health problems was described, while the diet of pregnant women with a sufficient amount of calories was making 93.2 % of the children born with no signs of problem.

In case of 23.5% low protein by pregnant women is correlated newborn health problems, while making 93.9% of pregnant women in the diet with sufficient amount of protein does not cause the newborn health problems. At the same time, 66.7% of newborn pathology observed in the case of pregnant women in low amount of protein in the diet ($X^2$ = 6.5; P <0.05).

Diagram 13

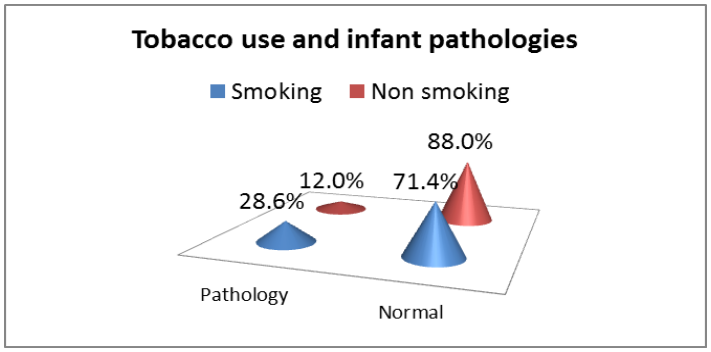



Low amounts of protein in the diet of pregnant women, the odds ratio index (OR) for infant health problem risk was 4.8 - times higher (OR = 5.1; 95% CI = 1.3 - 17.2), the relative risk (RR) indicator - 3.9 times higher (RR = 3.9; 95% CI = 1.3 - 11.9).

Of pregnant women who did not smoke signifying 94.3% of healthy newborn and pregnant women who smoked 28.6 % in case of newborn health problems. This results was not trustful P> 0.05, it takes , but there was shown a certain trend.

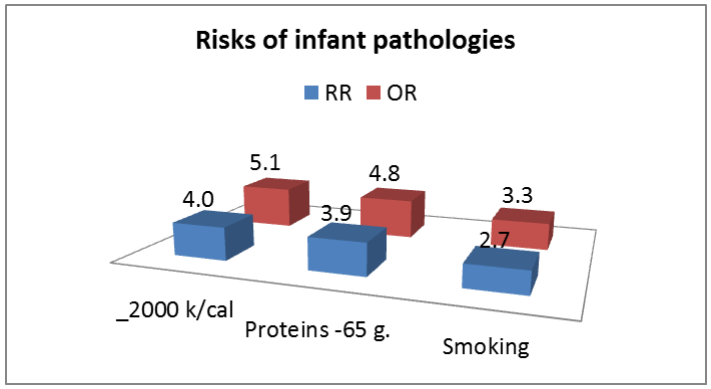
Pregnant women who smoke odds ratio (OR) for infants with health problem risk was 3.3 times higher (OR = 3.3; 95% CI = 0.6 - 19.4), the relative risk (RR) indicator - 2.7 times higher (RR = 2.7; 95% CI = 0.7 - 9.8).

Diagram 14




Thus infants with low birth-weight risk trend was following:

Diagram 15



**Conclusions:**

According to research results were formulated following conclusions:

1. According to the body mass index 64% of the mothers were overweight or obese. 25 % of infants was shown low (2800 g), and 23% higher (and more than 3900 g) weight. Various degrees of anemia were observed in 38 % of pregnant women and 41% of newborns.
2. In the diet of pregnant women there was shown following deficit, 50 % of milk, 51% - milk products, 50% - beef, 52% - chicken meat, 30% - fruit and 9% - a shortage of vegetables and herbs. 26 % of pregnant women had the deficit of calories, 34% had the deficit of protein and 36% had the deficit of carbohydrate. 7-7 % of pregnant women consume alcohol and cigarettes.
3. The infant birth weight was observed in cases when pregnant women received daily food at a low amount of calories (65.4%), proteins (47.1%), carbohydrates (44.4%), as well in the mother's hemoglobin low rate of 86.4% ($p < 0.01$). The risk of low birth weight infants increased when pregnant women receives low-calorie meals daily 9.7-times, 5.2-times in case of protein,-, 4.7 times in case of carbohydrate and in low rate of maternal hemoglobin cases - 10.3 times.
4. The infant birth with high weight was observed in cases where pregnant women received the high amount of calories (92.3 %), proteins (94.7 %) and carbohydrates (89.7 %) ($P <0.01$). High birth weight infants risk increased by pregnant women daily caloric intake of food 4.0 times, 9.3 times protein and carbohydrate- 4.7 times.
5. Low hemoglobin of newborn was observed in cases of pregnant women received a low amount of protein (70.6 %) and carbohydrates (58.3%) ($p <0.01$). Newborn low hemoglobin risk increases by low amount of protein intake 2.7 times, while the carbohydrate - 1.9 times.
6. Premature birth have been observed, when faced with a number of pregnant women by the low amount of calories (60.9%), low hemoglobin in the blood of pregnant women also-indicates (78.3%) and the high weight of pregnant women (56.5) at the time ($p <0.01$). Premature births in pregnant women increases the risk of low-calorie daily diet 4.0 times, pregnant women with low blood hemoglobin rate- 5.9 times and pregnant women with high weight - 5.9 times.
7. In the case of newborn health problems, there is a low amount of calories in the diet of pregnant women's calories (22.9%) and protein (23.5%) receiving, as well as - maternal smoking (28.6%). Infant health problem risk increases low-calorie in daily ration of pregnant, making 4.0 times, proteins - 3.9 times and 2.7 times that of the pregnant woman's tobacco users.

**Recommendations:**

According to the research worked out the following recommendations:

1. For the number of pregnant women with low hemoglobin, premature delivery and low birth weight and high infant prevention and health promotion it is recommended that pregnant women food rations contain 2200-2800 k / calories, 66-100 g. Protein, 300-400 g. Carbohydrate.
2. For pregnancy hemoglobin low number , premature delivery and low birth and high weight prevention and neonatal health promotion following pregnant diet is recommended: to increase milk (500 g), dairy products (50 g), beef (100 g), chicken meat (70 g), fish (70 g) Fruit (300 g), vegetables and greens points (500 g).

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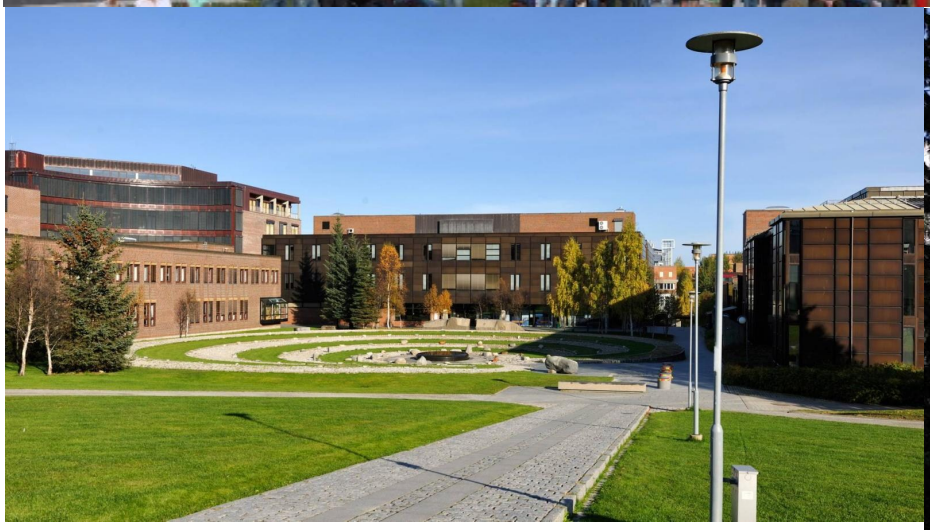

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