EPIDEMIOLOGY

2017-2018

Level	Master
Year	1
Trimester	Spring
ECTS	5
Status	Obligatory

Lectures	10
Seminars	15
Final control	Final test
Self-studying	4 000 min.

Instructor

Yuliia Barska
juliabarska@gmail.com

Yuliia is graduate of SPH NaUKMA. She is teaching at SPH NaUKMA since 2009. Has wide experience in planning, coordinating and analysis of data of epidemiological studies with different designs.

Introduction

This course belongs to public health block of courses. The aim of the course is to put future managers and researchers in public health in touch with "western epidemiology" --- a study of distribution, trends, and preventive / risk factors of diseases and other health-related states, and ways to control them. The main emphasis of a course is on acquiring methodology for studying all abovementioned things, in order to be able further properly and independently search for, critically read and use evidence base in public health. After completing a course, students will be able to orientate themselves in basic terms and concepts of epidemiology, to use and critically assess published data / studies results in this area, and also have principal skills for planning and implementing such studies and for analysis of epidemiological data.

Goals and learning outcomes

Aim of a course is to influence and provide skills to students to be guided by available evidence in their future work as public health professionals.

This course has two distinct goals. We expect that after completing a course, students

- will be able to orientate themselves in basic terms and concepts of epidemiology;
- will be able to use and critically assess published data / studies results in the area of public health.

↓ GENERAL PLAN OF A COURSE ↓

TOPIC	LECTURES	SEMINARS			TESTS
		DISCUSSIONS	PRACTICALS	TRAININGS	
Introduction: What is epidemiology	L1 Introduction to epidemiology			S1 How to search for articles S2 How to read statistics in articles	-
Study designs in epidemiology	L2 Study designs **L3 Study designs: Examples from Ukraine**	S4 Interventional studies S5 Observational analytical studies S6 Other common study designs	S3 Disease outbreak investigation		T1 Interventional and descriptive studies T2 Analytical observational studies
Bias and random errors in epidemiological studies	L4 Bias and random errors		S7 Bias and random errors		T3 Bias and random errors
Critical overview of epidemiological studies		S8 Critical review of epidemiological study			-
			S9 European health for all database		-
Measuring disease frequency	L5 Measuring disease frequency		S10 Measuring disease frequency		T4 Measuring disease frequency
Comparing disease frequencies	L6 Comparing disease frequencies		S11 Comparing disease frequencies		T5 Comparing disease frequencies
Systematic reviews	L7 Systematic reviews	S12 Systematic reviews			T6 Systematic reviews
Causality	L8 Causality	S13 Causality			T7 Causality
Screening programs	L9 Screening programs		S14 Screening programs		T8 Screening programs
Monitoring, evaluation, and surveillance	**L10 Monitoring, evaluation, and surveillance**	S15 Monitoring, evaluation, and surveillance			-

L = Lectures S = Seminars T = Tests **L – Guest lectures**

EVALUATION

ACTIVITY	POINTS PER 1	NUMBER	TOTAL
Lectures	-	10	-
Seminars	1 point	15	**15**
Current tests	5 points	8	**40**
Course assignment	20 points	1	**20**
SUBTOTAL			**75**
Final test			**35**
TOTAL			**110***

* 10 are bonus points☺

To be allowed to take final test, students are required to

- Attend at least 50% of all classes (e.g., 13 classes or more);
- Submit all current assignments (8 tests and 1 written work);
- Receive 30 points during trimester or more.

Late submission policy

Current tests submitted later than deadline but before the lecture on the respective topic could be assessed with 25% grade reduction. **Current tests submitted after the lecture on the respective topic will not be assessed.**

Course assignment submitted later than deadline but before final test could be assessed with 25% grade reduction. **Course assignment submitted after final test will not be assessed.**

Final assessment:

91-100	A (excellent)	30-59	FX (not passed)
81-90	B (good)		*is allowed to retake final test*
71-80	C (good)	0-29	F (not passed)
66-70	D (fair)		
60-65	E (fair)		

Activities:

- **Lectures**

All lectures except first are hold in the end of each topic, and summarize all material which topic covers, set focus on main theses, answer remained questions, etc.

- **Guest lectures**

2 guest lectures are planned, which will be held by people working in the respective field. Their topics could vary depending on competencies and availability of lecturers.

- **Seminars**

Seminars are of three types: discussions, practicals, and trainings. Attendance of seminars is assessed in 1 point.

- **Seminars: Discussions**

During these seminars, we discuss articles where results of epidemiological studies are presented. Articles are selected to represent specific concepts which are studied in each topic. Aim of the seminars is to see how all theoretical concepts are applied on practice.

- **Seminars: Practicals**

During practicals, tasks or cases are solved.

- **Seminars: Trainings**

2 trainings are planned: how to search for articles and full text of articles published in peer-reviewed journals, and how to read statistics in epidemiological articles.

- **Current tests**

All tests are home-take (completed at home on-line). For most of the topics, tests are performed before the first class and are based on reading basic information from handbooks.

- **Course assignment**

Course assignment is individual creative task, and requires applying all skills and knowledge got by a student during the course.

- **Final test**

Final test consists of multiple-choice questions covering all material of a course.

Course assignment:

1) Choose research question.
2) Analyze it using European Health for All Database and European Health for All Database (Ukrainian version). Provide diagrams, tables, maps (if needed); to each illustrative and analytical material give small comment / conclusion. *For international students, use only EHADB and/or other databases.*
3) Find 1 article with results of studying this question published in international peer-reviewed journals, and 1 article published in Ukrainian scientific journals (full text). *For international students, find second articles with results of study conducted in your country.*
4) Make critical review of these studies (using principle scheme from seminar).

Send by e-mail work with using of EHADB, full texts of 2 found articles, and critical reviews of them.

Assessment criteria for Course assignment:

- **Research question:** The ability to formulate (analytical) research question, which is relevant, and consistently answer it in all parts of the work **(max 5 points)**.
- **Work with databases:** The ability to select diverse and corresponding to posed research question material; logically and consistently elaborate the problem **(max 5 points)**.
- **Selection and analysis of Ukrainian article** (max 5 points).
- **Selection and analysis of international article** (max 5 points).
  The ability to find and select articles devoted to research questions; ability to find in them basic elements of the study conducted and briefly report them.

RECOMMENDED LEARNING SOURCES

Handbooks:

1. Bonita, Ruth. Basic epidemiology / R. Bonita, R. Beaglehole, T. Kjellström. --- 2nd ed. (World Health Organization, 2006).
2. Aschengrau, Ann. Essentials of epidemiology in public health / Ann Aschengrau and Goerge R. Seage III. --- 2nd ed. (Sudbury, Massachusetts: Jones and Bartlett Publishers, 2008).
3. Gordis, L. (2009). Epidemiology, 4th ed.. Philadelphia: Elsevier/Saunders.

Online handbooks:

4. Coggon, D. Epidemiology for the uninitiated / D. Coggon, Geoffrey Rose, DJP Barker. --- 4th ed. (MJ Publishing Group, 1997).
5. Online course in Epidemiology Research Methods / Pennstate University.

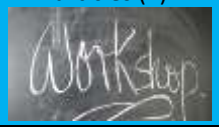
Other sources:

6. Ian R.H. Rockett. Population and Health: An Introduction to Epidemiology. --- 2nd ed. --- Population Bulletin, 54 (4) (Washington, DC: Population Reference Bureau, December 1999).
7. Зуева Л. П., Яфаев Р. Х. Эпидемиология : Учебник. --- СПб : ООО «Издательство ФОЛИАНТ», 2005. --- 752 с.
8. A Dictionary of Epidemiology / Last, J.M., ed. Oxford University Press, 2001.

Translated sources:

9. Coggon, D. Эпидемиология для непосвященных
10. Бигпхоп Р. Основы эпидемиопогии / Р.Бигпхоп, Р.Бонита, Т.Кьельстрём. --- Всемирная организация здравохранения, Женева, 1994.
11. Основи епідеміології: Вступ до прикладної епідеміології та біостатистики / Пер. з англ. О. Перепадя, Е. Хоменко; наук. ред. пер. І. Солоненко. --- К.: Основи, 1997. --- 501 с.
12. Эпидемиологический словарь / Под ред. Джона М. Ласта. --- 4-ое изд. --- Москва, 2009. --- 316 с.
13. С. Гланц. Медико-биологическая статистика. Пер. с англ. — М.: Практика, 1998. — 459 с.

↓ TIMETABLE ↓

Week	1	2	3	4	5	6	7
Tuesday	**January 16**	**January 23**	**January 30**	**February 06**	**February 13**	**February 20**	**February 27**
13:30-14:50		Where to search for articles (T) 	Disease outbreak investigation (P) 	Observational analytical studies (S) 			Critical review of epidemiological studies (S) 
15:00-16:20		How to read articles (T) 	Interventional studies (S) 	Other common study designs (S) 			European health for all database (P) 
23:59			*Interventional / descriptive studies (TEST)* 	*Analytical observational studies (TEST)* 	*Bias and random errors (TEST)* 		
Thursday	**January 18**	**January 25**	**February 01**	**February 08**	**February 15**	**February 22**	**March 01**
10:00-11:20		**Introduction to epidemiology (L)**					
Friday	**January 19**	**January 26**	**February 02**	**February 09**	**February 16**	**February 23**	**March 02**
10:00-11:20		Where to search for articles (T) 	Disease outbreak investigation (P) 	Observational analytical studies (S) 	Bias and random errors (P) 		Critical review of epidemiological studies (S) 
11:40-13:00		How to read articles (T) 	Interventional studies (S) 	Other common study designs (S) 	**Bias and random errors (L)**		European health for all database (P) 
13:30-15:00					Bias and random errors (P) 		

Ukrainian group | All | English group

T = Training S = Seminar P = Practical L = Lecture TEST = Home-take test

8 Week of independent work – no classes

Week	9	10	11	12	13	14	15
Tuesday	March 13	March 20	March 27	April 03	April 10	April 17	April 24
13:30-14:50	Study designs (L)						
15:00-16:20	Study designs (Guest lecture)						
23:59	*Measuring disease frequency (TEST)* 	*Comparing disease frequencies (TEST)* 	*Systematic reviews (TEST)* 	*Causality (TEST)* 	*Screening (TEST)* 		
Friday	March 16	March 23	March 30	April 06	April 13	April 20	April 27
10:00-11:20	Measuring disease frequency (P) 	Comparing disease frequencies (P) 	Systematic reviews (S) 	Causality (S) 	Screening programs (P) 	Monitoring, evaluation, and surveillance (Guest lecture)	FINAL TEST 
11:40-13:00	Measuring disease frequency (L)	Comparing disease frequencies (L)	Systematic reviews (L)	Causality (L)	Screening programs (L)	Monitoring, evaluation, and surveillance (S, P)	
13:30-15:00	Measuring disease frequency (P) 	Comparing disease frequencies (P) 	Systematic reviews (S) 	Causality (S) 	Screening programs (P) 		
Saturday	March 17	March 24	March 31	April 07	April 14	April 21	April 28
23:59						*COURSE ASSIGNMENT* 	

Ukrainian group | All | English group | T = Training | S = Seminar | P = Practical | L = Lecture | TEST = Home-take test

DETAILED PLAN OF A COURSE

Introduction: What is epidemiology

L1 Introduction to epidemiology

- Public health: Definition, tasks, examples of PH programs.
- Public health vs. medicine.
- Place of epidemiology in public health.
- Definition of epidemiology.
- Tasks of epidemiology.
- Modern epidemiology.

Required literature:

- WHO Handbook **Ch. 1 "What is epidemiology".**
- Ian R.H. Rockett. Population and Health: An Introduction to Epidemiology.

Additional literature:

- Aschengrau **Ch. 1 "The approach and evolution of epidemiology".**
- Coggon **Ch. 1 "What is epidemiology".**
- Gordis **Ch. 1 "Introduction".**

S1 ***Training: How to search for articles.*** *Search for articles and their full texts published in international and Ukrainian peer-reviewed journals*

Sources:

- PubMed http://www.ncbi.nlm.nih.gov/pubmed
- HINARI http://www.who.int/hinari/en/
- Дистанційний доступ до ресурсів НаУКМА http://www.elibukr.org/
- Репозитарій праць викладачів та студентів НаУКМА http://www.ekmair.ukma.kiev.ua/
- Оцифровані періодичні видання України на сайті НБУ ім. Вернадського http://archive.nbuv.gov.ua/portal/ http://dspace.nbuv.gov.ua/

S2 ***Training: How to read statistics in articles.*** *Publication of typical epidemiological study: Structure, main methodological points, results presentation, "reading" tables with uni-, bi- and multivariate analysis, results discussion.*

Study designs in epidemiology

L2 Study designs

- The basic research question of epidemiology.
- Overview and classification of study designs in epidemiology.
- Descriptive studies, interventional studies, analytical observational studies (cohort, case-control, cross-sectional, ecological):
  - Basic scheme;
  - Elements;
  - History (the first study of such type);

- Advantages and limitations;
- Examples of studies with such designs conducted in Ukraine.

Required literature:

- WHO Handbook **Ch. 3 "Types of studies" pp. 39-51.**

Additional literature:

- Aschengrau **Ch. 6 "Overview of epidemiologic study designs".**

S3 ***Case solving:*** *Investigating a disease outbreak:* *Asthma in Barcelona*

Required literature:

- Aschengrau **Ch. 5 "Descriptive epidemiology"**

Additional literature:

- Основи **Урок 6 «Дослідження спалаху хвороби»**, ст. 356-426.
- Coggon **Ch. 11 "Outbreaks of disease".**
- Gordis **Ch. 2 "The dynamics of disease transmission", pp.39-40.**

S4 Interventional studies ***(Article discussion)***. Intervention for BMI reduction: Discussion of main elements of the design on an example of published article with the results of evaluation of this program.

Required literature:

- Aschengrau **Ch. 7 "Experimental studies".**

Additional literature:

- Coggon **Ch. 9 "Experimental studies".**
- Gordis **Ch. 7 "Assessing the efficacy of preventive and therapeutic measures: Randomized trials".**

*S5 Observational analytical studies (****Articles discussion).*** Analytical observational studies: Levels of evidence of their results, on an example of a set of publications about relationship between water hardness and CVD.

- Aschengrau **Ch. 8 "Cohort studies", Ch. 9 "Case-control studies".**
- Coggon **Ch. 6 "Ecological studies" Ch. 7 "Longitudinal studies", Ch. 8 "Case-control and cross-sectional studies".**
- Gordis **Ch. 9 "Cohort studies", Ch. 10 "Case-control studies and other study designs**

*S6 Other common study designs (****Articles discussion).*** Other common study designs (nested case-control, panel, repeated cross-sectional, cross-over): Examples from published studies**.**

- Aschengrau **Ch. 9, pp. 250-252.**

L3 Study designs: Examples from Ukraine *(Guest lecture).*

Bias and random errors in epidemiological studies

L4 Bias and random errors

- Difference between systematic and random errors
- Random errors
  - Sample size and power calculations
  - P-value and confidence interval
  - Hypotheses testing (type I and type II errors)

- Systematic errors
    - Definition
    - Classification and main types
    - Selection bias: self-selection, loss to follow-up
    - Observation bias: recall, differential and non-differential miss-classifications
    - Ways of avoiding/controlling them
- Confounding and effect modification.

Required:

- WHO Handbook **Ch. 3 "Types of studies" pp. 51-61.**

Additional:

- Aschengrau **Ch. 10 "Bias", Ch. 11 "Confounding", Ch. 13 "Effect measure modification".**

S7 *Bias and random errors (**Tasks solving; Article discussion**)*

Required:

- Гланц **Гл. 1**, ст. 20-22 «Достоверность и статистическая значимость»; **Гл. 2,** ст. 36-44 «Выборочные оценки»; **Глава 3,** ст. 48-53 «Случайные выборки из нормально распределенной совокупности»; **Гл. 6,** ст.161-181 «Что значит незначимо: Чувствительность критерия»; **Гл. 7,** ст.193-205 «Доверительные интервалы».

Additional:

- Coggon **Ch. 4 "Measurement error and bias".**
- Gordis **Ch. 15 "More on causal inferences: Bias, confounding, and interaction".**

Critical overview of epidemiological studies

S8 *Critical review of epidemiological study (**Article discussion**).* Criteria for evaluation of publication with study results. Applying them to selected studies.

Required:

- Aschengrau **Ch. 14 "Critical review of epidemiological studies".**

European health for all database

S9 *European health for all database*

- European Health for All Database http://www.euro.who.int/en/data-and-evidence/databases/european-health-for-all-database-hfa-db
- EHADB Українська версія http://medstat.gov.ua/ukr/statreports.html

Measuring disease frequency

L5 **Measuring disease frequency**

- Aim of measuring disease frequency
- Prevalence, cumulative incidence, and incidence rate:
    - Definition
    - Calculation
    - Example of calculation
    - Interpretation of results
- Calculation of person-years
- Relationship among incidence, prevalence, mortality, and successful treatment

Required literature:

- WHO Handbook **Ch. 2 "Measuring health and disease".**

Additional literature:

- Aschengrau **Ch. 2 "Measures of disease frequency"**
- Gordis **Ch. 3 "Measuring the occurrence of disease: Morbidity"**
- Основи **Урок 2 «Частотні міри, які використовуються в епідеміології»,** ст. 95-161.

*S10 Measuring disease frequency (**Task solving).*** Calculating measures of disease frequency (prevalence, cumulative incidence, and incidence rate) using hypothetical data.

- Coggon **Ch. 2 "Quantifying disease in population"**

Comparing disease frequencies

L6 Comparing disease frequencies

- Aim of comparing disease frequencies
- Risk difference, risk ratio, attributable proportion
- 2x2 tables
- Risk ratios and odds ratios
- Interpretation of the results

Required:

- WHO Handbook **Ch. 2 "Measuring health and disease" --- pp.34-35.**

Additional:

- Aschengrau Ch. 3 "Comparing disease frequency".
- Gordis Ch. 11 "Estimating risk: Is there an association?", Ch. 12 "More on risk: Estimating the potential for prevention".

*S11 Comparing disease frequencies **(Task solving)**.* Calculating and interpretation measures for comparing disease frequencies (risk difference, risk ratio, odds ratio, and attributable proportion) using hypothetical data.

- Coggon **Ch. 3 "Comparing disease rates".**

Systematic reviews

L7 Systematic reviews

- Narrative and systematic reviews and meta-analysis. Definitions and differences.
- Sequence of conducting systematic review.
- Specific instruments for analyzing and presenting results: Forrest plot, Funnel plot, Study selection flow chart.
- Publication bias in systematic reviews: ways of detecting them and controlling for.
- Guidelines reporting systematic review and assessment studies with different designs: PRISMA, CONSORT, STROBE etc.
- Initiatives conducting systematic reviews in public health: The Cochrane collaboration, The Campbell collaboration, PROSPERO.
- Examples of systematic reviews conducted in Ukraine.

Recommended sources:

- **Uman**, L.S. (2011). **Systematic Reviews and Meta-Analyses.** *Journal of the Canadian Academy of Child and Adolescent Psychiatry;* 20(1): 57–59.
- Paul Glasziou, Chris Bain, and Graham Colditz. **Systematic reviews in health care : A practical guide.** --- Cambridge University Press, 2001. --- **Part 1.1. "The question"; Part 1.2 "Finding relevant studies"** (pp. 9-26).
- Higgins JPT, Green S (editors). **Cochrane Handbook for Systematic Reviews of Interventions** Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. --- **Ch. 8 "Assessing risk of bias in included studies", Ch. 10 "Addressing reporting biases"**.
- **Systematic Reviews : Guidance for undertaking reviews in health care** / Centre for Reviews and Dissemination, University of York, 2008 --- **Ch. 1.2 The review protocol** (pp. 6-15).
- **The Cochrane collaboration** http://www.cochrane.org/
- **The Campbell collaboration** http://www.campbellcollaboration.org/
- **PROSPERO** http://www.crd.york.ac.uk/PROSPERO/
- **PRISMA Checklist** http://prisma-statement.org/PRISMAStatement/Checklist.aspx
- **Reporting guidelines for Required study types** http://www.equator-network.org/

S12 *Systematic reviews* ***(Articles discussion).*** Examination of examples of systematic reviews published in Cochrane library, following 8 steps of conducting them.

Causality

L8 Causality

- Definition of causality. Necessary and sufficient causes. Koch's criteria (one-cause models). Rothman's "pies" (multi-causes models).
- Causation vs. association vs. risk factor. Attributable fraction.
- Hill's criteria for defining causal relationship.
- Classification and organization of (causal) relationships among factors: Causal pathways (Confounding, Effect modification, Interaction, Mediation, Collider Bias), Casual diagrams (Directed acyclic graphs), Web of causation, DPSEEA framework; The Multiple Exposure, Multiple Effects Framework.

Recommended sources:

- WHO Handbook **Ch. 5 "Causation in epidemiology".**
- **Rothman**, K.J., Greenland, S. (2005). **Causation and causal inference in epidemiology.** *American Journal of Public Health;* 95, (S1) : 44-50.
- **Hill**, A.B. (1965). **The Environment and Disease: Association or Causation?** *Proceedings of the Royal Society of Medicine;* 58(5): 295–300.
- **Vittinghoff**, E, et al. (2005). Regression methods in biostatistics: Linear, Logistic, Survival, and Repeated Measures Models. --- **Ch. 5.1 "Diagramming the Hypothesized Causal Model"**, pp. 135-136.
- **Greenland**, S. (1999). **Causal diagrams for epidemiologic research.** Epidemiology; 10 (1) :37-48.
- Aschengrau **Ch. 15 "The epidemiologic Approach to Causation".**

S13 *Causality* ***(Articles discussion).*** Does hormone replacement therapy causes breast cancer? Examination of examples of applying causal criteria to a set of studies aiming at exploring association between hormone replacement therapy and breast cancer.

Screening programs

L9 Screening programs

- Definition of screening. Examples of screening programs for different diseases.
- Natural history of disease and place for introducing screening in it.
- Types of screening programs: mass, multiple, targeted, opportunistic; general population vs. high-risk groups.
- Criteria for establishing a screening program (Wilson and Junger 10 criteria and their revised modern version).
- Bias in introducing and assessing a screening program.
- Risks from screening.
- Sensitivity, specificity, predicted value positive and predicted value negative of tests. Simultaneous and sequential applying of tests, net sensitivity and specificity.
- Relationship between sensitivity / specificity and prevalence of a disease. Relationship between sensitivity / specificity and cut-off value of a test.

Recommended sources:

- WHO Handbook **"Screening"**, pp. 110-114.
- Online course in Epidemiology Research Methods / Pennstate University. --- **Lesson 10 "Interventional Studies (1) Diagnostic Tests, Disease Screening Studies" .**
- Gordis **Ch. 18 "The epidemiological approach to evaluating screening programs"** , pp. 400-427.
- **Andermann**, A., et al. (2008). **Revisiting Wilson and Jungner in the genomic age: a review of screening criteria over the past 40.** *Bulletin of the World Health Organization;* 86 (4) : 317-319.
- **Marmot**, M.G., et al. (2013). **The benefits and harms of breast cancer screening: an independent review.** *British Journal of Cancer;* 108 (11) : 2205–2240.
- **CDC Guidelines for screening**

S14 *Screening programs **(Case solving)**.* Screening for HIV: Defining the best screening strategy for different populations.

Monitoring, evaluation, and surveillance

Guest classes

GUIDE FOR SEMINARS

S-1 How to search for articles

S-2 How to read statistics in articles

S-3 Disease outbreak investigation

S-4 Interventional studies

S-5 Observational analytical studies

S-6 Other common studies designs

S-7 Bias and random errors

S-8 Critical review of epidemiological studies

S-9 European health for all database

S-10 Measuring disease frequency

S-11 Comparing diseases frequencies

S-12 Systematic reviews

S-13 Causality

S-14 Screening programs

S-15 Monitoring, evaluation, and surveillance

S-1 How to search for articles

S-2 How to read statistics in articles

Kissin, D.M. et al. (2007). HIV seroprevalence in street youth, St Petersburg, Russia. *AIDS;* 21 : 2333-2340.

Please read an article precisely and then answer to following questions:

1. Structure of an article	
2. Research question(s)	
METHODS section	
3. Data collection:	
3.1. Study participants selection:	
3.1.1.Time, place	
3.1.2.Sampling method	
3.1.3.Sample size, Response rate	
3.1.4.Eligibility criteria, Inclusion, Exclusion criteria	
3.2. Collection of information	
3.2.1.What information	
3.2.2.How was collected	
4. Data analysis	
4.1. Software	
4.2. Statistical tests used	
4.3. Statistical measures used	
4.4. Other unknown terms	
5. Ethical issues	
RESULTS section	
6. Table 1 – Column 1	
6.1. According to results of this study, what was the prevalence of HIV among street youth in St Petersburg in 2006?	
6.2. What risky sexual practice was the most prevalent / the least prevalent?	
6.3. What substances were used the most often?	
7. Table 1 – Column 2	

7.1. According to these calculations, who were the most susceptible to be HIV-infected?	
8. Table 2 – Column 1	
8.1. What factors are	
8.1.1. positively associated with HIV infection	
8.1.2. negatively associated with HIV infection	
8.1.3. not associated with HIV infection?	
Consider: Significance (P-value), Confidence intervals (CI), Odds ratios (OR)	

8.2. Using information from Table 1, try to fill in the following table:

		Sex		
		Males	**Females**	**Total**
HIV	**HIV+**			
	HIV-			
	Total			**341**

8.3. Try to interpret to following line: Sex Male Female	 1.8 (1.4, 2.5)* Referent
9. Table 2 – Column 2	
9.1. What determinants remained significantly associated with being HIV-infected in this analysis?	
9.2. What group(s) of factors are associated with HIV infection at most?	
10. Table 3	
10.1. According to what characteristics HIV-positive boys and girls differ?	

S-3 Disease outbreak investigation

Case: Asthma in Barcelona

S-4 Interventional studies

Kong A.S., et al. (2013). School-based health center intervention improves body mass index in overweight and obese adolescents. *Journal of Obesity.*

The aim of this reading is to see, how the typical interventional study is designed. The value of this article is in the assessing of not clinical (as usual for experimental studies) but lifestyle intervention.

After you read it, be sure that you found and understood the following information.

INTRO:	
- **Relevance / Background** What is a burden of the problem? What consequences for health state of the population does it lead to?	
- Research question / hypotheses of the study	
DESIGN	
METHODS:	
- Year, study sites, division into interventional/control group	
- Theoretical model built into the intervention	
- Recruitment procedure, Inclusion/Exclusion/Withdrawal criteria, Enrollment/Attrition, Sample size	
- Intervention description	
- Comparator (Standard of care) description	
- Protocol approval and Protocol fidelity	
- **Outcome** measures: groups of variables, variables, instruments for measuring them	
- Process measurement	
- Data analysis: Sample size calculations, Statistical analysis	

RESULTS:	
Table 2+3: Baseline characteristics	
○ Distribution across different characteristics	
○ Significant / non-significant differences	
Table 4+5	
- **Baseline -- Follow-up comparison:**	
○ 95% CI interpretation	
- Between-group comparison of **difference:**	
○ Significant differences	
DISCUSSION:	
- Points mentioned by authors	
- Limitations	
CONCLUSIONS	

In the end of the article, link to the study registration info is provided: www.clinicaltrials.gov NCT00841334. You can enter these data and 1) See how "registration" of the experimental study looks like; 2) Find more details of this study; 3) See further publications of any.

S-5 Observational analytical studies

This set of papers represents 4 studies with the same research questions, but different study designs of observational analytical type.

For each paper, please read and extract the following information:

- Research question
- Study design
- Data analyzed
- Sample size
- Outcome measure + how it was measured
- Exposure variables + how they were measured
- Other variables included in the analysis
- Method of statistical analysis
- Main results of the study
- What are shown in the tables (and figures if applicable): Measures of association used, significant results.
- Limitations.

Fill this information in the table below.

	Ferrandiz (2004)	Ma (1995)	Yang (1998)	Leurs (2010)
Research question				
Study design	Ecological	Cross-sectional	Case-control	Cohort
Data analyzed				
Sample size				
Outcome measure + how it was measured				
Exposure variables + how they were measured				
Other variables included in the analysis				
Method of statistical analysis				
Main results of the study				
What are shown in the tables (and figures if applicable): Measures of association used, significant results.				
Limitations				

S-6 Other common studies designs

These set of readings represent other common study designs (analytical observational), which enable to reduce cost of a study and get quite rigorous inference.

Please get acquainted with each article, and then answer the questions.

/Guide developed by Tatiana Andreeva/

Nested case-control studies

Gražulevičienė, R., and Dulskienė, V. (2006). Risk factors for heart failure in survivors after first myocardial infarction. *Medicina (Kaunas);* 42(10) : 810-16.

1. What makes this study a case-control study?
2. What makes it a nested case-control study?
3. What is it nested in? How can we call this larger study?
4. Who are the participants of this larger study?

Repeated cross-sectional studies

Solbraa AK et al. (2010). Physical activity and cardiovascular risk factors in a 40- to 42-year-old rural Norwegian population from 1975–2010: repeated cross-sectional surveys. *BMC Public Health,* 14 : 569.

1. What more rigorous design does this one reproduce?
2. How this study would look like if it were that rigorous one?
3. How the data were collected?
4. What are the main limitations of this study on your opinion?

Case-crossover studies

McEvoy SP, et al. (2005). Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study. BMJ

1. What are the key differences of this study design compared to case-control studies?
2. What kind of data was used for this study?
3. How people were divided into cases and controls?
4. What statistical method of analysis was applied?

You can read more about case-crossover studies in ***Aschengrau, Chapter 9, pp. 250-252.***

Longitudinal studies: Cohorts, panels or repeated cross-sectional?

Frontini MG, Srinivasan R, Xu J, and Berenson GS (2004). Low birth weight and longitudinal trends of cardiovascular risk factor variables from childhood to adolescence: the bogalusa heart study. *BMC Pediatrics;* 4 : 22.

1. Please comment on the use of the terms 'cross-sectional surveys', 'panel design', 'cohorts' in this study.
2. How would you comment the use of 'control group' mentioned in the Methods? Does it refer to exposure or to outcome?
3. Which specific features distinguish this study from a repeated cross-sectional surveys?

S-7 Bias and random errors

Reading: Fillmore K.M. (2006). Moderate alcohol use and reduced mortality risk: Systematic error in prospective studies. Addiction Research and Theory; 1-31.

Please read the article and then report the following information:

1. What was done by authors (how the survey was performed?)
2. What was found (Is there is an protective association between light alcohol consumption and heart disease?)
3. Interpret graphs within Figure 2. What are plotted? What conclusions can we draw?

Практична робота: Конфаундинг, стратифікація, дво- і багатовимірний аналізи.

Дослідницьке питання: Чи є зв'язок між знаннями щодо способів запобігання інфікуванню ВІЛ і використанням презервативу?

Дані: Опитування щодо демографії і здоров'я, 2007 рік (Масив відповідей чоловіків)

Залежна змінна: Використання презервативу під час останнього статевого контакту

Незалежна змінна: Знання про способи запобігання інфікуванню ВІЛ статевим шляхом

(Утримуватися від статевих контактів, Мати одного незараженого ВІЛ партнера, Використовувати презервативи під час усіх статевих контактів)

Треті змінні: Регіон проживання:

Південь, Схід, Центр, Північ, Захід

Частина І. Порахувати відношення шансів (а) для всієї вибірки і (б) стратифіковано по регіонах

Всі чоловіки

		Результат: Використання презервативу		
		Ні	Так	**Разом**
Фактор нараження: Знання щодо ВІЛ	Неправильні			
	Правильні			
	Разом			

По регіонах:Південь

		Використання презервативу		
		ні	так	**разом**
Знання щодо ВІЛ	ні			
	так			
	разом			

ВШ (Південь) =

По регіонах: Центр, Схід, Північ

		Використання презервативу		
		ні	**так**	**разом**
Знання щодо ВІЛ	**ні**			
	так			
	разом			

ВШ (схід, північ, центр) =

По регіонах: Захід

		Використання презервативу		
		ні	так	**разом**
Знання щодо ВІЛ	ні			
	так			
	разом			

ВШ (Захід) =

Частина II. Тепер зробимо те саме, використовуючи дво- і багатовимірну логістичну регресійну модель

Залежна змінна: Використання презервативу під час останнього статевого контакту

Змінні / Категорії		**Сире ВШ**	**95% ДІ**	**Скориговане ВШ**	**95% ДІ**
Знання щодо ВІЛ					
	ні				
	так				
Регіон					
	Південь				
	Цент, Схід, Північ				
	Захід				

Exercise: Confounding, stratification, bi- and multivariate analysis.

Research question:	Is there an association between knowledge about HIV transmission prevention and condom use?
Data:	The 2007 Ukraine Demographic and Health Survey
	Men dataset
Primary outcome:	Condom use at last sexual intercourse
Primary exposure:	Knowledge about HIV sexual transmission prevention
	Abstain, Be faithful, Condomize
Variables controlled for:	Region of residence
	South, East, Center, North East

Part I. Calculate odds ratios for all sample and stratified by region

All men

		Outcome: Condom use		
		No	**Yes**	**Total**
Exposure: Knowledge about HIV	**No**			
	Yes			
	Total			

By region: South

		Condom use		
		no	**yes**	**total**
Knowledge about HIV (ABC)	**no**	53	64	
	yes	204	294	
	total			

OR (south) =

By region: Center, East, North

		Condom use		
		no	**yes**	**total**
Knowledge about HIV (ABC)	**no**	204	81	
	yes	788	436	
	total			

OR (east, north, center) =

By region: West

		Condom use		
		no	**yes**	**total**
Knowledge about HIV (ABC)	**no**	156	46	
	yes	271	70	
	total			

OR (west) =

Part II. Now do the same using bi- and multivariate logistic regression model

Dependent variable: Condom use at last sex

Variables / Categories		**Crude OR**	**95% CI**	**Adjusted OR**	**95% CI**
Knowledge about HIV (ABC)					
	no				
	yes				
Region					
	South				
	Center, East, North				
	West				

S-8 Critical review of epidemiological studies

Please, take the first article we discussed (Kissin) and extract the following information.

	Data Collection	
1	Context of the study	
2	Objectives	
3	Primary exposure=Independent variable	
	How it was measured	
4	Primary outcome=Dependent variable	
	How it was measured	
5	Type of study	
6	Source of the population	
	Subjects selection	
	Sample size	
	Ratio of propositi to comparison subjects	
7	Bias in selection of study subjects	
8	Bias in collection of information	
9	Possible confounding?	
	Data Analysis	
1	Methods to control confounding?	
2	Measures of association used	
3	Measures of statistical stability	
	Data Interpretation	
1	Major results	
2	Information bias, selection bias, confounding?	

3	Nondifferential misclassification?	
4	Limitations of the study	
5	Conclusions	
6	Generalization of results	+

Framework for assessment is taken from ***Aschengrau, Ch. 14 "Critical review of epidemiological studies".*** *Please, look there for explanation of different fields assessed.*

S-9 European health for all database

S-10 Measuring disease frequency

Exercises are taken from *Aschengrau, Ann. Essentials of epidemiology in public health / Ann Aschengrau and Goerge R. Seage III. --- 2nd ed. (Sudbury, Massachusetts: Jones and Bartlett Publishers, 2008).*

TASK 1

A population of 1,000 people is monitored for a year for the development of measles. No one has measles at the start of the investigation. Thirty people develop measles on June 30 and twenty people develop measles on September 30. Eight people are lost to follow-up on March 31 and twenty-four people are lost to follow-up on November 30. None of those lost to follow-up had developed measles prior to becoming lost. Assume that you can only get measles once.

A. What is the prevalence of measles on July 1?
B. What is the cumulative incidence of measles in this population?
C. What is the incidence rate of measles?

TASK 2

An epidemiological investigation was begun on July 1, 2000, among a population of 1,000 individuals. Three individuals were found to have leukemia on July 1st. During the ten-year follow-up period, five new cases of leukemia were diagnosed. Among the eight leukemia cases, four deaths occurred during the ten-year follow-up period. Two additional individuals, neither of whom had leukemia, were lost to follow-up at some point during follow-up. The diagram below indicates the experience of the 10 study participants. None of the remaining 990 study participants became ill, died, or were lost to follow-up during the follow-up period.

A. What was the prevalence of leukemia on January 1, 2005?
B. What was the cumulative incidence of leukemia during the 10-year follow-up period?
C. What was the incidence rate of leukemia during the 10-year follow-up period?

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
	----	---*--	-------	-------	-------	-------	-------	-------	-------	-------	---X	alive
	----	-------	-------	---*--	-------	-------	-------	-------	-------	-------	---X	alive
*<---	------	-------	-------	-------	-------	-------	-------	---X				dead
	----	-------	-------	-------	---X							lost
	----	-------	-------	-------	-------	-------	---*--	---X				dead
	----	-------	-------	-------	-------	-------	-------	-------	-------	---*--	---X	alive
	----	---*--	-------	-------	---X							dead
*<---	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	---X	alive
	----	-------	-------	-------	-------	-------	-------	---X				lost
*<---	-------	-------	---X									dead

***** case recognition (diagnosis of leukemia) ***<** onset of leukemia was prior to start of study period

---- observation period during follow-up **X** status at termination of observation (i.e., alive, dead, lost)

S-11 Comparing diseases frequencies

Exercises are taken from *Aschengrau, Ann. Essentials of epidemiology in public health / Ann Aschengrau and Goerge R. Seage III. --- 2nd ed. (Sudbury, Massachusetts: Jones and Bartlett Publishers, 2008).*

TASK 1

The 58th annual convention of the American Legion was held in Philadelphia from July 21 until July 24, 1976. People at the convention included American Legion delegates, their families, and other Legionnaires who were not official delegates. Between July 20 and August 30, some of those who had been presented became ill with a type of pneumonia that was subsequently named Legionnaires' disease. No one attending the convention developed the disease after August 30. The numbers of delegates and nondelegates who developed Legionnaires' disease during the period July 20 to August 30 (a 41-day period) are as follows:

Convention status	**Developed Legionnaires' disease**		**Total**
	Yes	**No**	
Delegate	125	1724	**1849**
Nondelegate	3	759	**762**
Total	**128**	**2483**	**2611**

A. Compute the cumulative incidence of Legionnaires' disease among delegates and nondelegates.
B. Calculate the cumulative incidence ratio of Legionnaires' disease among delegates compared to nondelegates.
C. State in words the meaning of this measure.
D. Calculate the cumulative incidence difference of Legionnaires' disease among delegates compared to nondelegates.
E. State in words the meaning of this measure. Calculate the attributable proportion of Legionnaires' disease among the delegates.
F. State in words the meaning of this measure.

TASK 2

Assume that you are participating in a survey searching for an association between red meat consumption and oral cancer. 3 000 persons with oral cancer and 3 000 healthy subjects were recruited. After the questioning conducted, it was revealed that 1 293 persons among out of who had oral cancer ate red meat 3 times per week and more, and 855 out of healthy participants consumed red meat with the same frequency.

A. Contract 2x2 table using the data given.

B. Which measure of comparison would you choose to define an association between meat consumption and oral cancer? Calculate this measure of association. Interpret it in one sentence.

Is red meat consumption protective or risk factor for oral cancer development?

S-12 Systematic reviews

Please, select 1 article out of the proposed (see Table below). / Будь ласка, виберіть 1 статтю з запропонованих (див. Таблицю нижче).

The proposed readings are reports of systematic reviews conducted within Cochrane Collaboration Initiative. Task is as following:

1. First read carefully the documents. Look at their structure, content of all appendixes, templates and purpose of main figures and tables.

2. The process of preparing systematic review has 8 steps (listed below). Describe systematic review which you examine according to these 8 steps.

   Steps are taken from «Cochrane Handbook for Systematic Reviews of Interventions». If necessary, please look at this source.

Наданий документ є звітом з систематичного огляду, проведеного у межах ініціативи The Cochrane Collaboration. Завдання таке:

1. Спочатку ознайомтеся з документом. Подивіться його структуру, зміст усіх додатків, вигляд і змістовне навантаження основних графіків і таблиць.

2. Процес підготовки систематичного огляду складається з восьми кроків (перераховані нижче). Тепер опишіть систематичний огляд, який Ви розглядаєте, за результатами застосування цих восьми кроків.

   Кроки взяті з «Cochrane Handbook for Systematic Reviews of Interventions». За необхідності, можна консультуватися з цим джерелом.

	8 Steps	**Echinacea for common cold**	**Green tea for cancer prevention**	**Health promoting schools**	**Vaccines for preventing influenza in adults**
1.	Research question				
2.	Inclusion criteria				
3.	Selected & collected studies				
4.	Possible bias in included studies				
5.	Meta-analysis				
6.	Reporting bias				
7.	Main results & Summary tables				
8.	Conclusions				

S-13 Causality

Does hormone replacement therapy cause breast cancer? An application of causal principles to three studies

The proposed reading is a set of publications where causality criteria are successively applied to several studies which explore association between use of hormone replacement therapy and development of breast cancer. Our task is to consider the arguments for each of the criteria in each of the studies. For this, please read the articles and fill the table below.

Запропоноване читання представляє собою низку публікацій, у яких строго і поступально застосовано критерії причиновості до результатів кількох великих досліджень, що знаходили зв'язок між застосуванням замісної гормональної терапії та розвитком раку молочної залози. Наше завдання полягає у тому, щоб розглянути аргументацію по кожному з критеріїв у кожному з досліджень. Для цього, прочитайте, будь ласка, статті заздалегідь та заповніть табличку нижче.

Study	The Collaborative Reanalysis	The Women's Health Initiative (estrogen + progesterone)	The Women's Health Initiative (unopposed estrogen)	The Million Women Study	**Conclusion** *Whether criteria was adhered, in how many studies out of 4*
1. Design					
2. Time order					
3. Information bias					
4. Detection bias					
5. Confounding					
6. Statistical stability and strength of association					
7. Duration-response					
8. Internal consistency					
9. External consistency					
10. Biological plausibility					
Association?					

S-14 Screening programs

In order to prevent the spread of human immunodeficiency virus (HIV), you are considering the idea to introduce screening for certain groups. Screening is possible through the use of rapid tests for HIV antibodies. In particular, you look at the following options:

- Mandatory HIV testing for all blood donors;
- Voluntary HIV testing for clients of harm reduction programmes injecting drugs.
- Mandatory HIV testing for all couples who are marrying.

Two tests are available: ELISA and Western blood. Both tests detect more than 90% of those who are infected and not, but, certainly, not all. Because of their different technical characteristics, their costs also differ (ELISA costs 10$, Western blot - - 100$).

There is also an option to use more expensive test only for confirming results of the cheapest one (e.g., for those who are positive or negative only --- depending on aim of a testing).

Is it rational to introduce the following screening programmes:

- **ELISA tests for blood donors?**
- **ELISA tests for clients of harm reduction programs injecting drugs?**
- **Do the results HIV detection among blood donors will be improved if donors received first positive ELISA test, perform a second ELISA test, to confirm their results? If the second test will be performed using Western blot?**
- **Is it cost effective to test marrying couples with sequential ELISA-Western blot tests?**

Reference information:

1. *ELISA is able to identify 97.0% of all HIV-positive and 99.8% of free from HIV infection people.*
2. *Western blot identifies 95.0% of all HIV-infected and 99.99% of healthy people.*
3. *HIV prevalence among the general population is 400 cases per one million people. HIV prevalence among people who inject drugs (PWID) is 100 cases per 1 000 PWID.*
4. *Next year 60 000 couples will marry. The cost of visiting the service provider for blood test is 40$.*

/Based on CDC case/

З метою запобігти поширенню вірусу імунодефіциту людини (ВІЛ), Ви розглядаєте ідею ввести скринінг окремих груп населення. Скринінг є можливим завдяки використанню швидких тестів на антитіла до ВІЛ. Зокрема, Ви розглядаєте такі опції:

- Обов'язкове тестування на ВІЛ усіх донорів крові;
- Добровільне тестування на ВІЛ клієнтів програм зменшення шкоди від вживання ін'єкційних наркотиків.
- Обов'язкове тестування на ВІЛ усіх пар, що беруть шлюб.

Для тестування доступні 2 тести: ELISA та Western blood. Обидва тести виявляють більше дев'яноста відсотків як інфікованих, так і вільних від інфекції людей, проте, звичайно, не всіх, --- і, відповідно, через свої різні технічні характеристики, мають різну вартість (ELISA коштує 10$, Western blot --- 100$).

Перевагою є те, що, у випадку, коли дешевший тест дає незадовільні результати, додатково можна застосовувати той самий або дорожчий тест уже тільки до тих людей, які виявилися позитивними (або негативним --- залежно від мети тестування), щоб уточнити їхній результат.

Чи раціонально впроваджувати такі скринінгові програм:

- **Чи варто використовувати ELISA для тестування донорів крові?**
- **Чи варто використовувати ELISA для тестування клієнтів програм зменшення шкоди від вживання ін'єкційних наркотиків?**
- **Чи покращаться результати виявлення ВІЛ серед донорів крові, якщо тим донорам, які отримали позитивний результат першого тесту за ELISA, робити другий тест ELISA, щоб підтвердити їхній результат? Якщо робити для підтвердження позитивного результату другий тест за допомогою Western blot?**
- **Чи є економічно ефективно тестувати шлюбні пари за допомогою послідовних тестів ELISA та Western blot?**

Довідкова інформація:

1. *ELISA здатна визначити 97.0% усіх ВІЛ-інфікованих і 99.8% усіх здорових від ВІЛ-інфекції.*
2. *Western blot визначає 95.0% усіх ВІЛ-інфікованих і 99.99% усіх здорових від ВІЛ-інфекції.*
3. *Поширеність ВІЛ серед загального населення складає 400 випадків на 1 000 000 осіб. Поширеність ВІЛ серед людей, що вживають ін'єкційні наркотики (ЛВІН), складає 100 випадків на 1 000 ЛВІН.*
4. *Наступного року шлюб на підвідомчій Вам території візьме 60 000 пар. Вартість відвідання надавача послуг для здачі крові складає 40$.*

/На основі *кейсу CDC*/

S-15 Monitoring, evaluation, and surveillance

Guest seminar