

ESA 2018

27th Annual Conference

Ethiopian Statistical Association (ESA)

ETHIOPIAN STATISTICAL ASSOCIATION
የኢትዮጵያ ስታቲስቲክስ ባለሙያዎች ማህበር



27th Annual Conference
March 24 – 25 , 2018

Theme:

Statistical In-depth Analysis for Optimal Use of Data

Plantinum Sponsor:

The Central Statistical Agency – Statistics For Results

CONFERENCE PROGRAM AND BOOK OF ABSTRACTS

March 24 – 25, 2018, Addis Ababa, Ethiopia

Venue - Elilly International Hotel Conference Hall

ESA 2018

27th Annual Conference

Ethiopian Statistical Association (ESA)

Program

ESA 2018

27th Annual Conference of Ethiopian Statistical Association (ESA),

March 24 - 25, 2018, Addis Ababa, Ethiopia

Venue: Elilly International Hotel Conference Hall

Theme:

Statistical In-depth Analysis for Optimal Use of Data

Plantinum Sponsor of the Conference is the Central Statistical Agency (CSA) – Statistics For Results (SFR)



27th Annual Conference

Ethiopian Statistical Association (ESA)

ESA 2018 ORGANIZING COMMITTEES

EXECUTIVE COMMITTEE

President	Dr. Ayele Taye
Vice President	Dr. Essey Kebede
Training Coordinator	Dr. Zeytu Gashaw
Research and Project Coordinator	Dr. Dejen Tesfaw
Members and Chapters Affairs Coordinator	Dr. Tsega Kahsay
Finance and Administrative Coordinator	Abdulaziz Shiffa
Secretary General	Misganaw Abebaw

AUDITOR

Tiruzer Tenagne

SECRETARIAT

Zenaw Ayele

JESA EDITORIAL COMMITTEE

Editor	Dr. Emmanuel G/Yohannes
Secretary	Mekonnen Tadesse
Associate Editors	Dr. Butte Gotu Prof. Eshetu Wencheke Dr. Fentaw Abegaz Prof. Kiros Berhane Dr. Solomon Harrar

ADVISORY BOARD MEMBERS

Addisu Fekadu	Ethiopia
Ayele Menbere	U.S.A.
Aynew Ejigou, Prof.	Ethiopia
Bute Gotu, PhD	Ethiopia
Demelash Megersa	Ethiopia
Emanuel G/Yohannes, PhD	Ethiopia
Eshetu Wencheke, Prof.	Ethiopia
Fasil Nebebe, PhD	Canada
Fentaw Abegaz, PhD	Netherlands
Gene Bizuneh	Ethiopia
Legesse Ayane	Ethiopia
Martha Sintayehu	Ethiopia
Mekonnen Tadesse	Ethiopia
Shibru Temesgen, PhD	Ethiopia
Sileshi Fanta, PhD	South Africa
Zerihun Tadesse	U.S.A.

General Information

Conference Location

Elilly International Hotel, Kazanchis, Addis Ababa, Ethiopia.

Registration

The registration desk at the Elilly International Conference Hall will be open at 8:00AM on Saturday 24 March 2018. Conf shall be given to those registered.

Internet Access

Free wireless internet access will be provided to ESA 2018 participants during the days of the Conference at the Hall. The information needed in order to access the wireless network will be provided at the registration desk at the conference venue.

Contact Info

Ethiopian Statistical Association ESA

College of Natural Science, AAU,

1st Floor, Building Dep. Earth Sciences

P.O.Box 5724, Addis Ababa, Ethiopia

Tel: +251-11-1239452

E-mail: ethstat@gmail.com

Website: <http://www.ethstat.org.et>

Conference Program

27th Annual Conference of Ethiopian Statistical Association (ESA)
 Addis Ababa, Ethiopia, 24-25 March 2018
 Venue: Elilly International Hotel Conference Hall

SATURDAY, 24 MARCH 2018	
08.00-8.30	Registration
SESSION 1: Opening Statements <i>(Room: Meeting Hall)</i>	
08.30-09.30	<p>Master of Ceremony: Dr. Essey Kebede, Vice President of ESA</p> <p>Remarks: Dr. Ayele Taye, President of ESA</p> <p>Remarks: Mr. Biratu Yigezu, Director General, Central Statistics Agency</p> <p>Official Opening: Guest of Honor Dr. Yinager Dessie, Commissioner, National Planning Commission</p>
SESSION 2: Panel Discussion <i>(Room: Meeting Hall)</i>	
<p>Chair: Dr. Butte Gotu, Addis Ababa University, Ethiopia / Mr Biratu Yigezu, Geneal Manager of CSA</p> <p>Reporter: Mr. Abdulaziz Shifa</p>	
09:30-11:00	<p>Topics of Panel Discussion:</p> <ul style="list-style-type: none"> - Development and Challenges of Statistics Education and Research in Ethiopia - In-depth Analysis of Available Survey and Census Data Sets <p>Panelists: Mr Amare Legesse, Deputy Dirctor General of CSA, Dr Essey Kebede, Getachew Tekle, Dr Negusse Yohannes, Dr Haftu Gebrehiwot</p> <p>Discussion</p>
11.00-11.20	Health Break
SESSION 3: Invited Scientific Talks <i>(Room: Meeting Hall)</i>	
<p>Chair: Dr. Emanuel G., Ethiopian Civil Service University, Ethiopia</p> <p>Reporter: Mr. Bedilu Alamire, Addis Ababa University, Ethiopia</p>	
11.20-13.00	<p><i>35 minutes for each presenter and 30 minutes discussion</i></p> <p>Paper1: Improving Scientific Rigor and Reproducibility in Mental Health Studies</p> <p>Speaker: Dr. Abera Wouhib, National Institute of Mental Health (NIMH) / National Institutes of Health (NIH), USA</p> <p>Paper 2: Experimental Bayesian Inversion Problems.</p> <p>Speaker: Dr. Ayele Taye, ESA</p> <p>Discussion</p>
13.00-14.00	Lunch Break

SESSION 4: Parallel Sessions: Meta Analysis <i>(Room: 01)</i>	
Chair: Dr. Emanuel G., Ethiopian Civil Service University, Ethiopia Reporter: Mr. Anteneh Tesemma, Addis Ababa University, Ethiopia.	
14.00-15.30	<p>Topic: <i>Meta Analysis (15 minutes for each presenter)</i></p> <p>Paper 1: The Global Prevalence of Type Two Diabetes Mellitus among Hepatitis C Virus Infected Patients: A Systematic Review and Meta-analysis Speaker: Sintayehu Ambachew</p> <p>Paper 2: Multidrug Resistant Tuberculosis in Ethiopian Settings and Its Association with Previous History of Anti-Tuberculosis Treatment: A Systematic Review And Meta-Analysis Speaker: Setegn Eshetie</p> <p>Paper 3: Tuberculosis Treatment Outcomes in Ethiopia from 2009 To 2017, and Impact of HIV Co-infection and Prior Drug Exposure: A Systematic Review and Meta-Analysis Speaker: Setegn Eshetie</p> <p>Paper 4: HIV and HIV-HBV Co-infection Among Pregnant Women in Ethiopia: A Meta-Analysis of Observational Studies Speaker: Demeke Geremew</p> <p>Paper 5: Mother-to-Child Transmission of HIV among Infants in Ethiopia: A Systematic Review and Meta-Analysis Speaker: Aklilu Endalamaw</p> <p>Discussion</p>
SESSION 5: Parallel Sessions: Survival Data Analysis <i>(Room: 02)</i>	
Chair: Dr. Dejen Tesfaw, Addis Ababa University, Ethiopia Reporter: Mr. Abdulaziz Shifa, CSA	
14.00-15.30	<p>Topic: <i>Survival Data Analysis (15 minutes for each presenter)</i></p> <p>Paper 1: Survival Analysis and Risk Factors of Mortality for Adult HIV/AIDS Patients Following Antiretroviral Therapy (ART) in Mizan-Tepi University Teaching Hospital, South West Ethiopia. Speaker: Belete Mulatu</p> <p>Paper 2: Statistical Analysis of CD4+ Cell Counts progression of HIV-1-positive Patients enrolled in Antiretroviral Therapy at Hossana District Queen Eleni Mohamad Memorial Hospital, South Ethiopia Speaker: Getachew Tekle</p> <p>Paper 3: Time to Recovery from Obstetric Fistula and Determinants in Gondar University Teaching and Referral Hospital, Northwest Ethiopia Speaker: Leltework Yismaw</p>

	<p>Paper 4: Assessing Survival Time of Women with Cervical Cancer Using Various Parametric Frailty Models: A Case Study at TikurAnbessa Specialized Hospital, Addis Ababa, Ethiopia</p> <p>Speaker: Selamawit Endale</p> <p>Paper 5: Parametric Modeling of Survival Data Based on Human Immune Virus (HIV) Infected Adult Patients under Highly Active Antiretroviral Therapy (HAART): A Case of Zewditu Referral Hospital, Addis Ababa (AA), Ethiopia</p> <p>Speaker: Haftu Legesse</p> <p>Discussion</p>
15.30-15.50	Health Break
SESSION 6: Business Session <i>(Room: Meeting Hall)</i>	
Chair:	Dr. Butte Gotu, ESA GA Chairperson
Rapporteur:	Seifu Neda, ESA GA Secretary
15.50-17.30	<ul style="list-style-type: none"> ▪ ESA-EC annual report ▪ Audit report ▪ Discussion on the reports ▪ ESA Bylaw amendment ▪ Election of Auditor and EC members
End of day	

SUNDAY, 25 MARCH 2018	
SESSION 7: Invited Talks <i>(Room: Meeting Hall)</i>	
Chair: Dr. Haftu G/Hiwot, Mekele University	
Rapporteur: Dr. Negusse Yohannes, Wachamo University	
08:30-10:30	<p><i>35 minutes for each presenter and 30 minutes discussion</i></p> <p>Paper 1: Long Range Dependence, Nonlinear Trend And Breaks In Historical Sea-Surface and Land-air-surface Global and Regional Temperature anomalies</p> <p>Speaker: Dr Ola Oluwa S. Yaya</p> <p>Paper 2: Pattern Identification and Anomaly Detection of Cyber Threats Using Extreme Value Analysis and Decision Tree</p> <p>Speaker: Dr Tsega Kahsay</p> <p>Discussion</p>
10:30-10:50	Health Break
SESSION 8: Parallel Sessions: <i>Survival and Longitudinal Data Analysis</i> <i>(Room: 01)</i>	
Chair: Mr. Mekonnen Tadesse, Addis Ababa University	
Rapporteur: Mr. Bedilu Alamire , Addis Ababa University	
10:50 - 12:30	<p>Paper 1: Modeling Evolution of HIV/AIDS Disease Progression: A Parametric Semi-Markov Model with Interval Censuring</p> <p>Speaker: Tilahun Ferede</p> <p>Paper 2: Modeling Time-to-cure from Severe Acute Malnutrition: Application of Various Parametric Frailty Models</p> <p>Speaker: Akalu Banbeta</p> <p>Paper 3: Tuberculosis Incidence and Predictors among Human Immunodeficiency Virus-Infected Children after Starting Antiretroviral Therapy: A Retrospective Cohort Study</p> <p>Speaker: Akililu Endalamaw</p> <p>Paper 4: Modeling on Longitudinal Blood Glucose and Time to Micro Vascular Complication on T2DM: the Case of DebreMarkos and FelegeHiwot Referral Hospitals, Ethiopia</p> <p>Speaker: Negusse</p> <p>Paper 5: A Pair Copula Construction Cumulative Logit Model for Longitudinal Ordinal Data with Application to Household Food Insecurity Data</p> <p>Speaker: Jemal Ayalew</p> <p>Paper 6: A Longitudinal Data Analysis on Risk Factors for Developing Type-2 Diabetes Mellitus: A Case Study at Gondar Referral Hospital.</p> <p>Speaker: Melkamu Ayana</p> <p>Discussion</p>

SESSION 9: Parallel Sessions: Clinical Trials/TimeSeries/GLM/Data Mining*(Room: 02)***Chair:** Dr. Girma Taye, Addis Ababa University, Ethiopia**Rapporteur:** Mr. Gezahegn Getahun, ESA member**10:50 - 12:30****Paper 1:** Lymphedema Management to Prevent Acute Dermatolympangiadenitis in Podoconiosis (Golbet): A Pragmatic Randomised Controlled Trial in Northern Ethiopia**Speaker:** Henok Negussie**Paper 2:** Volatility of Export Price of Coffee in Ethiopia**Speaker:** Demisew Gebru**Paper 3:** Statistical Models for Longitudinal Zero Inflated Count Data: Application to Seizure Attacks**Speaker:** Demeke Lakew**Paper 4:** Method-Mix of Contraception and Its Factors in Emerging Regions Of Ethiopia**Speaker:** Wondiber Nega**Paper 5:** Exploring Trend and Barriers of Antenatal Care Utilization using Data Mining Technique: Proof from Pooled Ethiopian DHS of 2000, 2005, 2011, 2016**Speaker:** Kedir Hussein**Discussion****12:30-13:30****Lunch Break****SESSION 10: General Discussion and Closing***(Room: Meeting Hall)***13:30-14:00****General Discussion****Closing Speech*****End of Conference***

Book of Abstracts

SATURDAY, 24 MARCH 2018

SESSION 2

Paper 1: Development and Challenges of Statistics Education in Ethiopia (part of panel discussion)

GetachewTekle

Abstract

Statistics are sets of mathematical equations that are used to analyze what is happening in the world around us. When used correctly, statistics tell us any trends in what happened in the past and can be useful in predicting what may happen in the future. Statistics has impacted the curriculum in all level education fields. In almost every discipline, the ability to understand, interpret, and critically evaluate research findings are becoming an essential core skill. Some examples of how statistics shape your life when you don't even know it as Weather Forecasts, Emergency Preparedness, Predicting Disease, Medical Studies, Genetics, Political Campaigns, Insurance, Consumer Goods, Quality Testing, Stock Market and has important role in determining the existing position of per capita income, unemployment, population growth rate, housing, schooling medical facilities etc...in a country. Now statistics holds a central position in almost every field like Industry, Commerce, Trade, Physics, Chemistry, Economics, Mathematics, Biology, Botany, Psychology, Astronomy etc..., so application of statistics is very wide. However, there are challenges mattering Statistics education not assure it quality. Hence, the current country's attention should be on tackling these challenges to do so by standing with an ambitious plan, Statistician participatory education. And also all stakeholders, universities, colleges, CSA, ministry of education should work to bring about awareness of the role of statistics in academia and society in general. The main objective of this work was to facilitate the way the countries all stakeholders lay an interventional ground on the challenges for quality statistics education development ambitiously. Hereby, the author will take the audience through a journey, in particular topics to be discussed will include: what makes Statistics differ from other disciplines? Do people like or dislike it? Why do people use it? What is the role of statistics in the contemporary development of education? What is the role of statistics in achievement of the 2nd GTP of the country? Why statistics education limited to only university level in the country? Why some departments like education/behavioral sciences and law do not take statistics? Why statistics education is limited to only regular program? Who should own statistics teaching in the context of the country educational policy? Does it make sense Statistics to be incorporated as in independent subject from elementary level in the educational policy of the country?

Key words: Development of statistics education; Challenges in Statistics education

SESSION 3**Paper 1: Improving Scientific Rigor and Reproducibility in Mental Health Studies**

Abera Wouhib

Abstract

Conducting rigorous studies and the ability to reproduce the research findings are the two cornerstones for advancement of biomedical science. However, there has been a growing concern whether published studies can be reproduced. As a result, the need to promote the highest level of scientific integrity, public accountability, and social responsibility in conducting scientific research have been one of the priorities for the National Institutes of Health (NIH). With approximately \$34B annual budget, NIH has been promoting rigorous and transparent research in all areas of science through variety of grant programs. Statistical validation has become a vital component of data-oriented programs including mental health studies. In mental health studies, data with severe heterogeneity and autocorrelations are persistent and complicate the analytical procedures. Furthermore, the presence of small effects and high dimensionality have challenged the standard statistical approach and analytical methods. Consequently, rigor and reproducible study results through enhanced statistical methods and analytical strategies are critical for the National Institute of Mental Health (NIMH), which supports most of mental health research programs. Complexity in mental health data warrants the need to develop sophisticated statistical approaches that seeks attention to well-established but often ignored methodological principles. In this presentation, we will discuss the statistical priorities in mental health studies to improve the scientific rigor and reproducibility. More importantly, we will discuss potential roles of statisticians in advancing studies in behavioral and mental disorder which is part of the biomedical research at-large.

Keywords: Mental health, Neuroimaging, Reproducibility, Rigor

Paper 2: Experimental Bayesian Inversion Problems

Ayele Taye

Abstract

Bayesian inversion is an interesting research area. The traditional inversion problem has a long history while the respective modern computations are only recently developments. In this paper, the experimental Bayesian inversion problem is defined and its computational algorithm is presented with some examples. The experimental inversion is defined as the traditional inversion problem with additional complication that the forward model is not directly accessible but with an error term. The usual methods such as Markov chain Monte Carlo (MCMC) sampling and maximum a posteriori (MAP) estimation are not directly available to this extended inverse problem. New experimental Bayesian inversion algorithm is developed and studied with simulations. The results of the linear experimental Bayesian inversion problem show that conditional expectation and variance are consistently estimated. The convergences are faster compared to that of the traditional approaches.

Keywords: Algorithm, Bayesian, Experimental inversion, Inverse problem, Statistical computation.

SESSION 4

Paper 1: The Global Prevalence of Type Two Diabetes Mellitus among Hepatitis C Virus Infected Patients: A Systematic Review and Meta-analysis

Sintayehu Ambachew

Abstract

Background: The ever-increasing global hepatitis C infection is fuelling the burden of diabetes mellitus. Several studies have reported that hepatitis C virus infection is an important risk factor for the development of diabetes mellitus. However, the results of fragmented studies reported variable and inconsistent finding on the prevalence of type two diabetes mellitus among hepatitis C virus infected patients. Therefore, this meta-analysis aimed to estimate the overall prevalence of type two diabetes mellitus in patients infected with hepatitis C virus.

Methods and analysis: This systematic review includes original articles of cross-sectional studies of populations regarding patients diagnosed with hepatitis C infection that have reported the prevalence of type two diabetes mellitus, published from 1994 to 2017. Two reviewers in three databases searched. Random-effects meta-analysis model were used to obtain an overall summary estimate of the prevalence of type two diabetes mellitus among hepatitis C infected patients. Sensitivity analysis was conducted to check the stability of summary estimate. Heterogeneity was assessed by using I^2 statistic. Funnel plots analysis and Egger's test were used to investigate publication bias. Results from sub-group analysis were also presented by geographical region.

Results: A total of 23 eligible articles reported data from 11,113 study participants were included in this meta-analysis. The pooled prevalence of type two diabetes mellitus among hepatitis C virus infected patients was 21.90% (95% CI: 18.50, 25.30). The subgroup analysis showed, pooled prevalence of 28.59% (95% CI: 17.43, 39.74) in Africa, 26.14 % (95% CI: 19.80, 32.48) in Europe, 19.09% (95% CI: 14.78, 23.41) in Asia, and 15.66% (95% CI: 11.58, 19.74) in North America.

Conclusion: The overall prevalence of type two diabetes mellitus among hepatitis C virus infected patients was considerably high in a global perspective. The highest prevalence was noted in Africa and Europe, followed by Asia and North America. **Protocol registration number:** PROSPERO International Prospective Register of Systematic Reviews (CRD42018083409).

Keywords: Diabetes Mellitus; Hepatitis C Virus; Meta-analysis; Prevalence

Paper 2: Multidrug resistant tuberculosis in Ethiopian settings and its association with previous history of anti-tuberculosis treatment: a systematic review and meta-analysis

Setegn Eshetie

Abstract

Background: Efforts to control the global burden of tuberculosis (TB) have been jeopardized by the rapid evolution of multi-drug resistant *Mycobacterium tuberculosis* (MTB), which is resistant to at least isoniazid and rifampicin. Previous studies have documented variable prevalence of multidrug-resistant tuberculosis (MDR-TB) and its risk factors in Ethiopia. Therefore, this meta-analysis is aimed, firstly, to determine the pooled prevalence of MDR-TB among newly diagnosed and previously treated TB cases, and secondly, to measure the association between MDR-TB and a history of previous anti-TB drugs treatment.

Methods: PubMed, Embase and Google Scholar databases were searched. Studies that reported a prevalence of MDR-TB among new and previously treated TB patients were selected. Studies or surveys conducted at national or sub-national level, with reported MDR-TB prevalence or sufficient data to calculate prevalence were considered for the analysis. Two authors searched and reviewed the studies for eligibility and extracted the data in pre-defined forms. Forest plots of all prevalence estimates were performed and summary estimates were also calculated using random effects models. Associations between previous TB treatment and MDR-MTB infection were examined through subgroup analyses stratified by new and previously treated patients.

Results: We identified 16 suitable studies and found an overall prevalence of MDR-TB among newly diagnosed and previously treated TB patients to be 2% (95% CI 1% - 2%) and 15% (95% CI 12% - 17%), respectively. The observed difference was statistically significant ($P < 0.001$) and there was an odds ratio of 8.1 (95% CI 7.5–8.7) for previously treated TB patients to develop a MDR-MTB infection compared to newly diagnosed cases. For the past 10 years (2006 to 2014) the overall MDR-TB prevalence showed a stable time trend.

Conclusions: The burden of MDR-TB remains high in Ethiopian settings, especially in previously treated TB cases. Previous TB treatment was the most powerful predictor for MDR-MTB infection. Strict compliance with anti-TB regimens and improving case detection rate are the necessary steps to tackle the problem in Ethiopia.

Keywords: Multidrug resistant tuberculosis, Meta-analysis, Systematic review, Ethiopia

Paper 3: Tuberculosis Treatment Outcomes in Ethiopia from 2009 To 2017, and Impact of HIV Co-Infection and Prior Drug Exposure: A Systematic Review and Meta-analysis

Setegn Eshetie

Abstract

Background: Knowledge on the tuberculosis (TB) treatment outcomes is substantially needed to assess the performance of national TB controls programs (NTPs). To date, the overall estimates of treatment outcomes have not been determined in Ethiopia. Therefore, this meta-analysis was undertaken to produce pooled estimates of TB treatment outcomes and to analyze the impact of prior anti-TB drug exposure and HIV co-infection.

Methods: Potentially relevant studies were retrieved from PubMed, Embase, and MEDLINE online databases. Unpublished studies have been retrieved from the grey literature through Google and Google Scholar. Statistical analysis was done using STATA version 11 and pooled estimates were calculated using random effect model. Summary estimates are also presented using Forest plots and Tables.

Results: A total of 34 studies are included for meta-analysis. The pooled estimate of successful TB treatment outcomes amounts to 83.7% (95% CI 81.1% - 86.3%). Of successfully treated cases, 33.9% were cured and the remaining completed cases. Besides, nearly 50% deaths were indicated among the 16.3% patients with poor treatment outcome. Sub-group analysis shows that high treatment success rate was estimated in Afar; 88.9% (95% CI 83.8% - 94.2%), followed by Oromia; 88.5% (95% CI 82.6% - 94.5%) and Addis Ababa; 85.4% (95% CI 77.7% - 93.1%), whereas relatively poor treatment outcome was noted in Tigray; 20.0% (95% CI 2.1% - 37.9%) and Amhara; 19.0% (95% CI 12.6% - 25.5%). Unsuccessful TB treatment outcome was found to be higher among HIV/TB co-infected cases with an odds ratio of 1.98 (95%CI, 1.56 - 2.52) and re-treated cases with an odds ratio of 2.17 (95%CI, 1.55 – 3.03). The time trend was assessed from 2009 to 2017, but it shows insignificant variation with treatment outcomes (P = 0.108).

Conclusion: The rate of successful treatment outcome in Ethiopia appears generally high, only slightly below the threshold suggested by the World Health Organization. History of tuberculosis treatment and HIV/TB co-infection were inversely associated with favorable treatment outcomes.

Keywords: Tuberculosis, Treatment outcome, Meta-analysis, Ethiopia.

Paper 4: HIV and HIV-HBV co-infection among pregnant women in Ethiopia: a meta-analysis of observational studies

Demeke Geremew

Abstract

Background: HIV causes millions of death worldwide, and the prevalence is surging again in Ethiopia. To date, the pooled prevalence of HIV infection among pregnant women was not conducted in Ethiopia. Thus, this systematic review and meta-analysis aimed to figure out the pooled prevalence of HIV and its co-infection with HBV among pregnant women in Ethiopia.

Methods: We searched PubMed, Google scholar, Science Direct and EMBASE databases to select the most relevant studies in Ethiopia. A total of 1405 titles were identified and 15 studies met the inclusion criteria. Descriptive and quantitative data of included studies were presented in tables and forest plots. The I^2 statistics was used to assess heterogeneity between studies. The random effects model was used to determine the pooled prevalence analysis and 95% confidence intervals. The statistical analysis was performed using the Stata version 11.

Result: A total of 13,746 participants were considered from 15 included studies. Among subjects, 717 were infected by HIV only, and 12 were HIV-HBV co-infected pregnant women. In this meta-analysis, the pooled prevalence of HIV among pregnant women in Ethiopia was 5.74% (95% CI; 3.96%–7.53%). Regional analysis showed that 9.50% (95% CI; 7.76%–11.23%) in Amhara, 4.80% (95% CI; 3.12%–6.49%) in Addis Ababa, 2.14% (95% CI; -0.54%–4.82%) in SNNP and 4.48% (95% CI; 2.56%–6.41%) in Oromia region. Besides, six studies reported HIV-HBV co-infection and the pooled prevalence was 0.68% (95% CI; 0.27%–1.08%) among pregnant women in Ethiopia.

Conclusion: The pooled prevalence of HIV infection in pregnant women was considerably high in Ethiopia. Moreover, high prevalence of HIV infection was also determined in Amhara region, followed by Addis Ababa and Oromia compared to SNNP. This study also sought the burden of HIV-HBV co-infection. Therefore, national HIV prevention and interventional planning on pregnant women has to be based on the knowledge of HIV regional prevalence and its co-infection with HBV.

Keywords: HIV, Pregnant women, Systematic review, Meta-analysis, Ethiopia

Paper 5: Mother-to-child Transmission of HIV Among Infants in Ethiopia: A Systematic Review and Meta-analysis

Aklilu Endalamaw

Abstract

Background: The mother-to-child transmission rate and risk factors of HIV showed a wide variation in Ethiopia and the public health burden of this problem need estimation. This systematic review and meta-analysis intended to provide the pooled estimation of mother-to-child transmission rate and its major factors in Ethiopia.

Methods: We searched PubMed, Google Scholar, EMBASE and Web of Science databases for all available references up to October 2017. We included cohort and cross-sectional studies conducted in Ethiopia. Heterogeneity was checked using the I-squared statistic. Egger's test and the funnel plot were used to assess publication bias.

Results: A total of 12 studies with 3872 individuals were included in this systematic review and meta-analysis. The pooled estimated mother-to-child transmission rate was 12.4 % (95% CI= 8.9 to 15.8). In the subgroup analysis, higher infection rate found in Addis Abeba (19.3%), followed by Oromia (13.4%) and Amhara (9.6%).The pooled odds ratio of mother-to-child transmission of HIV for the infants delivered at home was 5.64 (95% CI= 3.6 to 8.7), who didn't take antiretroviral prophylaxis was 8.0 (95% CI= 4.7 to 13.3), and on mixed feeding was 7.0 (95% CI= 4.1 to 12.2).

Conclusions: This systematic review and meta-analysis showed that mother-to-child transmission rate of HIV was high in Ethiopia. Home delivery, not taking antiretroviral prophylaxis, and mixed infant feeding practices increased the risk of HIV transmission.

Protocol registration: It is registered in the Prospero database: (PROSPERO 2017:CRD42017078232)

Keywords: HIV-exposed infants; HIV transmission; predictors; Meta-analysis; Ethiopia

SESSION 5

Paper 1: Survival Analysis and Risk Factors of Mortality for Adult HIV/AIDS Patients Following Antiretroviral Therapy (ART) in Mizan-Tepi University Teaching Hospital, South west Ethiopia.
Belete Mulatau

Abstract

Background: Acquired immune deficiency syndrome (AIDS) is a medical condition caused by the human immunodeficiency virus (HIV) and has been the major problem worldwide. Even if, ART treatment has shown significant clinical importance by meeting the goal of therapy, there are still facing a number of deaths due to socio-economic, demographic, behavioral risk and health factors.

Objective of the Study: The objective of this study was aimed to investigate the survival status and predictors of

mortality for adult HIV positive patients treated under ART.

Methods: A retrospective cohort study was conducted on 1285 cases of HIV-infected patients aged 15 years and greater who were enrolled on ART at MTU Teaching Hospital from September, 2007 to January, 2015 and followed until July 30, 2015. Baseline patient records were extracted from electronic and paper based medical records. Time to death was the main outcome measure. Survival analysis was conducted where the Kaplan Meier method was used to compare survivorship. A multivariable Cox regression was also done to assess the significant predictors of mortality.

Results: During the follow up period in the cohort, a total of 1285 patients contributed to 59, 237 person-years of follow up and 273 (21%) of the patients died giving the overall incidence rate of 4.6 per 1, 000 person years (273/59237). The overall mean estimated survival time of patients under the study was 46 months while the average treatment time for the dead patients was 26 months. The mortality rate was very high in the earlier months of HAART initiation and tended to stabilize later. Of a total of 273 dead patients, about 32% and 12% of the deaths occurred within 6 months and between 6 and 12 months of HAART initiation, respectively.

Conclusions: The results of the multivariable Cox proportional hazards regression model revealed that having concomitant TB infection, low baseline CD4 count, low baseline weight, being rural area dweller, being substance user, older age, lower educational levels, higher WHO clinical stages, functional status and marital status were all significantly associated with progression to death for HIV/AIDS infected patients. For this reason, early initiation of ART despite the CD4 count, nutritional support and close monitoring of patients in the early period of ART treatment initiation is very crucial to improve patient survival.

Keywords: HIV/AIDS; Mortality; HAART; Survival Analysis; Incidence rate; Predictors of death; Antiretroviral therapy; retrospective study; Ethiopia.

References

- AlemayehuSiffir and BedaneGemechu (2015). Determining Factors that Affect the Survival Status of HIV Infected Patients under ART: The Case of St. Luke Catholic Hospital and College of Nursing (SLCHCN), Woliso, Ethiopia. *International Journal of Basic and Applied Sciences*, 2015, 1(1), 19-36.
- Badri M, Wilson D, Wood R. Effect of highly active antiretroviral therapy on incidence of tuberculosis in South Africa: a cohort study. *Lancet* 2002; 359: 2059-64.
- Collett D., *Modeling Survival Data in Medical Research*. Chapman and Hall, London, 2003.
- Cox D. R. Regression models and life-tables. *Journal of the Royal Statistical Society. Series B* 34 (1972), 187-220.
- Hosmer D.W. and Lemeshow S. (1999). *Applied Survival Analysis*. John Wiley and Sons, Inc., New York.
- Tsiatis A. and Zhang D. *Analysis of Survival Data Lecture Notes*. Daowen Zhang, Department of Statistics North Carolina State University, 2005.
- UNAIDS. (2015). *Factsheet 2015: Global Statistics*. Geneva.
- World Health Organization (2015). *HIV/AIDS Fact sheet N°360*. Geneva.
- World Health Organization (2014). *Global Update on the Health Sector Response to HIV*, Geneva.

Paper 2: Statistical Analysis of CD4+ Cell Counts progression of HIV-1-positive Patients enrolled in Antiretroviral Therapy at Hossana District Queen ElleniMohamad Memorial Hospital, South Ethiopia.

Getachew Tekle

Abstract

Background: Human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) have caused the world most shocking tragedy and risk. Mortality among patients on HAART is associated with high baseline levels of HIV RNA, WHO stage III or IV at the beginning of treatment, low body mass index, severe anemia, low CD4+ cell count, type of ART treatment, gender, resource-poor settings, and poor adherence to HAART.

Objective: The main objective of this study was to make use of appropriate modeling approach to CD4+ cell progression and identify the potential risk factors affecting the CD4+ cell progression of ART patients in Hossana District Queen ElleniMohamad Memorial Hospital.

Methods: In this longitudinal retrospective based study secondary data was used from Hossana District Queen ElleniMohamad Memorial Hospital. The study population consists of 222 HIV-1-positive patients, measured repeatedly at least one time on each patient who are 15 years old or older those treated with ART drugs from September 2011 to May 2014. The data was analyzed using SAS 9.2 version procedure NLMIXED. Poisson, Poisson-gamma, Poisson-normal, and Poisson-normal-gamma models were applied to study over-dispersion and correlation in the data.

Results: A total of 222 adult ART HIV-1-positive patients were included in this study. Out of these ART patients, 131(59%) were female patients and 91(41%) were male patients; 65(29.30%) were followed the drug combinations properly; the mean and standard deviation of baseline CD4+ cell counts were 355.9 and 321.4 cells per milliliter of blood, respectively; the mean and standard deviation of age of patients ($p=0.0001$) were 31.06 and 8.50 years, respectively; patients were followed for a mean of 24 months ($p=0.0001$). The analysis showed that the covariates significant for the progression of CD4+ cell counts were age of the patient, time since seroconversion, and sex at 5% level of significance.

Conclusion: On average CD4+ cell count increases after patients initiated to the HAART program (the disease rate declines). The progression of end outcome depends on patient's baseline socio-demographic characteristics. For the presence of over-dispersion, and clustering, the Poisson-normal-gamma model results in improvement in model fit.

Keywords: CD4+ cell count; Poisson-normal-gamma model; Over dispersion; Correlation

Paper 3: Time to recovery from obstetric fistula and determinants in Gondar university teaching and referral hospital, North West Ethiopia

Leltework Yismaw

Abstract

Introduction: Obstetric fistula is an abnormal connection between the vagina and rectum and/or bladder which may develop after prolonged and obstructed labor which leads to continuous urinary or fecal incontinence. It is a serious problem in the world's poorest countries, where most mothers give birth without any medical help. In most cases obstetric fistula can be treated if carried out by a competent surgeon and followed up with proper postoperative care. However, there remains to explore more on the duration of obstetric fistula recovery and determinant factors. This study aimed to identify determinant factors of time to recovery from obstetric fistula.

Objective: The aim of this study was to estimate average recovery time of obstetric fistula after surgical repair and its determinant factors in Gondar University Teaching and Referral Hospital, northwest Ethiopia.

Method: A retrospective follow up study was conducted at Gondar University Teaching and Referral Hospital. A total of 612 fistula cases were included in the study using simple random sampling technique. To explore the data Kaplan-Meier and log rank test were computed. Weibull regression survival model was done to identify determinant factors with recovery time of obstetric fistula. Univariate frailty was employed to accommodate unobservable effect of fistula patients.

Results: Among 612 patients, 539(88.07%) were recovered. Average recovery time was 5.14 weeks (95% CI: 4.74, 5.55). Antibiotic use (HR=1.50, 95% CI=1.10-2.03), history of ANC (HR=1.95, 95% CI=1.38-2.75), literate patients (HR=2.00, 95% CI=1.45-2.77), length (HR=0.82, 95% CI=0.73-0.91) and width (HR=0.78, 95% CI=0.69-0.88) of fistula were predictors of rate of recovery.

Conclusion: The average recovery time from obstetric fistula was 5.14 week. Small Length and width of fistula, patient educational status (literacy), antibiotic use and history of antenatal care visits help to shorten the recovery time of obstetric fistula. It is recommended to responsible body make Interventions based on these determinant factors.

Key words: obstetric fistula, survival analysis, recovery time, Gondar

Reference

- Getachew T, Taye A, Jabessa S. Survival Analysis of Time to Recovery from Obstetric Fistula: A Case Study at Yirgalem Hamlin Fistula Hospital, Ethiopia. *Journal of Biometrics & Biostatistics*. 2015;6(3):1.
- Goh JT, Browning A, Berhan B, Chang A. Predicting the risk of failure of closure of obstetric fistula and residual urinary incontinence using a classification system. *International Urogynecology Journal*. 2008;19(12):1659-62.
- Browning A. Prevention of residual urinary incontinence following successful repair of obstetric vesicovaginal fistula using a fibro-muscular sling. *BJOG*. 2004;111.
- Nardos R, Browning A, Chen CCG. Risk factors that predict failure after vaginal repair of obstetric vesicovaginal fistula. *Obstet Gynecol*. 2009;200:578.

Paper 4: Assessing Survival Time of Women with Cervical Cancer Using Various Parametric Frailty Models: A Case Study at TikurAnbessa Specialized Hospital, Addis Ababa, Ethiopia

Selamawit Endale

Abstract

Background: Cervical Cancer is one of the leading causes of death in the world and represents a tremendous burden on patients, families and societies. It is estimated that over one million women worldwide currently have cervical cancer; most of them have not been diagnosed or have no access to treatment that could cure them or prolong their lives. The goal of this study is to investigate potential risk factors affecting survival time of women with cervical cancer at TikurAnbessa Specialized Hospital.

Method: Data were taken from patients' medical record card that enrolled during September 2011 to September 2015. Kaplan-Meier estimation method, Cox proportional hazard model and parametric shared frailty model were used to analysis survival time of cervical cancer patients.

Results: The Lognormal inverse Gaussian model has the minimum AIC value among the models compared. The results implied that not giving birth up to the study ends and married after twenty years were significantly prolong the survival time of patients while age class 51-60, 61-70, >70, smoking cigarettes, patients with stage III & IV disease, family history of cervical cancer, history of abortion and living with HIV AIDS were significantly shorten survival time of patients.

Conclusion: The findings of this study suggested that age, smoking cigarettes, stage, family history, abortion history, living with HIV AIDS, age at first marriage and age at first birth were major factors to survival time of patients. Heterogeneity between the regions in the survival time of cervical cancer patients, indicating that one needs to account for this clustering variable using frailty models. The fit statistics showed that lognormal inverse-Gaussian frailty model described the survival time of cervical cancer patients dataset better than other distributions used in this study.

Keywords: Survival Data Analysis, Proportional hazard, parametric frailty, cervical cancer, survival time

References:

1. WHO (2009). Human papiloma virus and related cancers in Ethiopia. In Summary report.
2. Rebecca S. and Jemal. A (2015). Global Cancer Facts & figures 2nd Edition.
3. World Health Organization (2015). Comprehensive cervical cancer control: A guide to essential Practice
4. Collett, D. (2003). Modeling Survival Data in Medical Research Chapman & Hall, London
5. Sastry, N. (1997). A Nested Frailty Model for Survival Data, With an Application to the Study of Child Survival in Northeast Brazil. Journal of the American Statistical Association. 92:426-43

6. David G. Kleinbaum Mitchel Klein (2005). Survival Analysis, A Self-Learning Text, Second Edition
7. Mantel, N. and Haenszel, W. (1959) Statistical aspects of the analysis of data from retrospective studies of disease. J Natl Cancer Inst 22, 719-748.
8. Zorn, Beck, and Jones.(2000).Unobserved Heterogeneity and Frailty Models. Political analysis.2:79–86.
9. Hougaard, P.(1984). Life table methods for heterogeneous populations: Distributions describing heterogeneity. Biometrika. 71:75-83.
10. Hougaard, P. (1986). Survival models for heterogeneous populations derived from stable distributions. Biometrika, 73(2), 387-396.
11. Akaike's H. (1974). A new look at the statistical model identification. IEEE Trans Automatic Control.
12. Ayele.G(2015). Survival Analysis of Time-to-First Birth after Marriage among Women in Ethiopia: Application of Parametric Shared Frailty Model.
13. Akalu.b, Belay. B(2015). Modeling time-to-cure from severe acute malnutrition: a comparison of various Parametric frailty models

Paper 5: Parametric Modeling of Survival Data Based on Human Immune Virus (HIV) Infected Adult Patients under Highly Active Antiretroviral Therapy (HAART): A Case of Zewditu Referral Hospital, Addis Ababa (AA), Ethiopia
Haftu Legesse

Abstract

In the present article our aim is to model the HIV infected adult patients' dataset. A retrospective cohort study was conducted in Zewditu Referral Hospital located in Addis Ababa, Ethiopia. Records of patients enrolled between September 2010 and August 2014 were reviewed continuously using patients' Antiretroviral Therapy (ART) unique identification numbers as reference. Kaplan-Meier survival curves and Log-Rank test were used to compare the survival experience of different category of patients. Then we attempted to model the above data with the help of four parametric survival models namely; Exponential, Weibull, Gompertz, and Log-logistic. All fitted models were compared separately by using AIC and log likelihood. The log-logistic model gave a better description of the time-to-death of HIV infected adult patients than the other models. Based on log-logistic model, age, weight, and functional status, TB screen, World Health Organization (WHO) clinical stage and educational level were found to be the most prognostic factors of time-to-death. Furthermore a high risk of death of patients was found to be associated with lower initial weight, WHO clinical stage IV, lower CD4 count, being ambulatory, bedridden, and TB screened and illiterate.

Keywords: Human immunodeficiency Virus; Acquired immune deficiency syndrome; Parametric Models; HAART; ARTCD.

SESSION 7

Paper 1: Long range dependence, Nonlinear trend and Breaks in historical Sea-surface and Land-air-surface Global and Regional Temperature anomalies

Ola Oluwa S. Yaya and Olalekan J. Akintande

Abstract

The global temperature series is a major indicator of climate change, whereas this indicator has undergone shift in trend over the 20th century, changing from linear trend to nonlinear trend as a result of structural breaks. This present paper investigates global and regional sea-surface and land-air-surface temperature series from 1880 to 2016 by means of fractional integration technique. The results show that temperature series are described by trend stationary process, mostly in long memory range in the case of land-air-surface temperature while in the case of sea-surface temperature, temperature series are in mean reverting range for global and hemispheric temperature as well as for three other regional locations. By applying the multiple structural break test, we find the trend line breaking in many dates, locking up into many regimes which can be described using nonlinear trend structure. Nonlinear trend based on Chebyshev inequality in the fractional integration framework show that global and regional temperature series can be represented using nonlinear trend up to third order since this further lowers the integration order to long memory range in both Sea-surface and land-air-surface temperature series.

Keywords: Chebyshev inequality; Long memory; Nonlinearity; Regional temperature; Structural break

Paper 2: Pattern Identification and Anomaly Detection of Cyber Threats Using Extreme Value Analysis and Decision Tree

Tsega Kahsay and Tames Rietdijk

Abstract

Anomaly detection is a method of identifying abnormal patterns in data. It is important to develop strategies that protect cyber-attacks so that prediction can be made to prevent similar attacks in the future. The objective of the study was to identify the patterns of cyber data in terms of risk. Out of the 17 data files, we considered "Attacks" file, which contains 16278463 cases with 10 attributes. Some of the attributes were timestamp, atype(type of malicious attack), severity, source(source IP), sport(source port), dest(destination IP), dport(destination port), and sensorid. We applied Extreme Value Analysis (EVA) to label the hourly aggregated timestamp data as normal or anomaly. We also applied Decision tree to classify the EVA labeled data into normal or anomaly as well as to classify the attack type data into one of the atypes. From the summary statistics, atype 5 is the most frequent observation, it is about 50.9%. From the top 10 source IPs, the mode IP was 1.146.125.159-CN(China) and the 2nd

frequent IP was 222.149.135.186-RO(Romania). The occurrences of 3-10 attacks in an hour were observed mostly on August regardless of the year. From EVA, the 91% of data was selected as the suitable threshold. From the Decision tree, more anomalies occur on the hours: 13:00, 16:00, 19:00, and 20:00. Less anomalies occur on the months: September, October, November, and February. When considering atype as dependent variable with categories: 0, 3, 4, 5, and 7; 100% of atype=0 was predicted by severity=1, dport=3127, dport=5554, dport=42, dport=1023, dport=5000, and dport=2745. 100% of atype=3 was predicted by severity=1 and dport=80. 100% of atype=5 was predicted by severity=16, dest=223.89.112.161, dest=223.89.112.183, and hours: 13:00; 3:00; 8:00. 100% of atype=7 was predicted by severity=1, dport=22, and dport=2222. We concluded that 5 was the most frequent predicted category and severity=16 and severity=32 were only atype=5 predictors.

Keywords: Anomaly, Extreme Value Analysis, Decision Tree, Supervised, and Unsupervised.

References

- Balakrishna , P.V. and Ganesh , B.R. (2014). Anomaly Detection and SQL Prepare Data Sets for Data Mining Analysis, International Journal of Computer Science and Information Technologies (IJCSIT), Vol. 5 (5) , pp.6551-6555.
- Kumar, V., Dokas, Paul P., Eilertson, E., Ertoz, L., Lazarevic, A., Steinbach, M., Simon, G., Srivastava, J., Tan, P-N., Chandola, V., Kim, Y., Zhang, Z-I., Ranka, S., Grossman, B. (2004). Parallel and Distributed Computing for Cyber Security. Army High Performance Computing Research Center, Department of Computer Science, University of Minnesota.
- Lee, W., and Stolfo, S.J. (1998). "Data Mining Approaches for Intrusion Detection." Seventh USENIX Security Symposium (SECURITY _98), San Antonio, TX.
- Mageswary, G., Karthikeyan, M. (2018). Intrusion Detection Using Data Mining Techniques, International Journal of Engineering Science Invention (IJESI) ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org || PP. 20-25
- Xue, Y., Wang, J., Liu, Y., Xiao, H., Sun, J., Chandramohan, M. (2015). Detection and Classification of Malicious JavaScript via Attack Behavior Modelling. Nanyang Technological University and Singapore University of Technology and Design, Singapore, ISSTA'15 , July 13–17, 2015, Baltimore, MD, USA, Copyright 2015 ACM 978-1-4503-3620-8

SESSION 8

Paper 1: Modeling Evolution of HIV/AIDS Disease Progression: A Parametric Semi-Markov Model with Interval Censuring

Tilahun Ferede and Ayele Taye

Abstract

The introduction of highly active anti-retroviral therapy (HAART) for the treatment of AIDS patients has made significant improvements in patient survival and quality of life during late 1990 (WHO, 2008). Thus, in this work we focused on estimation of HIV/AIDS Disease progression using parametric Semi-Markov Models and assessed factors affecting HIV/AIDS Disease progression of individuals who are following ART therapy during 2008-2015 with time-dependent covariates in Yirgalim General Hospital, Ethiopia. The findings of this study indicate that HIV/AIDS Disease progression can vary greatly according to patient's gender, Body Mass Index, and Weight Gain/Loss during the follow-up, Age of the patient and other unknown factors associated. By including time-dependent covariates, we show that these factors had significant differences in HIV/AIDS Disease progression. We also found that Parametric Semi-Markov models are a powerful approach for studying chronic diseases and using appropriate waiting times distributions for disease progression. Finally, our results underscore the need for selecting appropriate waiting time distribution and for accurately estimate disease progression.

Key words: Disease progression; HIV/AIDS; Semi-Markov Model; Time varying covariate, Transition

References

- Andrew C. Titman, Linda D. Sharpies. Semi-Markov Models with Phase- Type Sojourn Distributions. *Biometrics*. 2010;66,742-752.
- Asena, T. & Goshu, A. (2017). Comparison of Sojourn Time Distributions in Modeling HIV/AIDS Disease Progression. *Biometrical Letters*, 54(2), pp. 155-174. doi:10.1515/bile-2017-0009.
- Mathieu E, Yohann F, Pierre D, Jean-Pierre D. Parametric and Non Homogeneous semi-Markov Process for HIV Control, PNHSM Process for HIV Control.

Paper 2: Modeling Time-to-cure from Severe Acute Malnutrition: Application of Various Parametric Frailty Models

Akalu Banbeta

Abstract

Background: In developing countries about 3.5% of children aged 0–5 years are victims of severe acute malnutrition (SAM). Once the morbidity has developed the cure process takes variable period depending on various factors. Knowledge of time-to-cure from SAM will enable health care providers to plan resources and monitor the progress of cases with SAM. The current analysis presents modeling time-to-cure from SAM starting from the day of diagnosis in Wolisso St. Luke Catholic hospital, southwest Ethiopia.

Methods: With the aim of coming up with appropriate survival (time-to-event) model that describes the SAM dataset, various parametric clustered time-to-event (frailty) models were compared. Frailty model, which is an extension of the proportional hazards Cox survival model, was used to analyze time-to-cure from SAM. Kebeles (villages) of the children were considered as the clustering variable in all the models. We used exponential, weibull and log-logistic as baseline hazard functions and the gamma as well as inverse Gaussian for the frailty distributions and then based on AIC criteria, all models were compared for their performance.

Results: The median time-to-cure from SAM cases was 14 days with the maximum of 63 days of which about 83% were cured. The log-logistic model with inverse Gaussian frailty has the minimum AIC value among the models compared. The clustering effect was significant in modeling time-to-cure from SAM. The results showed that age of a child and co-infection were the determinant prognostic factors for SAM, but sex of the child and the type of malnutrition were not significant.

Conclusions: The log-logistic with inverse Gaussian frailty model described the SAM dataset better than other distributions used in this study. There is heterogeneity between the kebeles in the time-to-cure from SAM, indicating that one needs to account for this clustering variable using appropriate clustered time-to-event frailty models.

Keywords: Severe acute malnutrition, Parametric frailty, Accelerated failure time model

Paper 3: Tuberculosis Incidence and Predictors among Human Immunodeficiency Virus-Infected Children after starting Antiretroviral Therapy: A Retrospective Cohort Study

Aklilu Endalamaw

Abstract

Background: Tuberculosis is a predominant opportunistic infection among HIV-positive children in developing countries. There are different contributing factors involved to increase tuberculosis infection.

Objective: This study aimed to assess tuberculosis incidence and predictors among human immunodeficiency virus-positive children on antiretroviral therapy in Northwest Ethiopia

Methods: A total of 352 children followed from March 2005 to April 2017. Kaplan-Meier was used to estimate tuberculosis-free survival probability. We used a Cox-proportional hazard model to show independent predictors with a p-value ≤ 0.05 was inferred statistically significant.

Results: The study found thirty-four (9.7%) tuberculosis cases. The overall tuberculosis incidence rate was 2.63 per 100 person-years in the 1294.7 person-years observation. The median tuberculosis-free survival time was 135 months. Overall tuberculosis-free survival proportion at the end of the study was 82% (95%CI (Confidence Interval) = 74 to 88%). Being on WHO clinical stage 3 and 4 (AHR (Adjusted Hazard Ratio) =3.0 (95% CI=1.2 to 7.7), a fair and poor adherence level to ART (AHR=4.0 (95%CI= 1.5 to 10.8)), started ART after 3 months of HIV care (AHR=4.0 (95%CI=1.5 to 10.6)) and ≤ 6 months duration on ART (AHR=5.5 (95% CI= 1.5 to 20.6)) were predictors of tuberculosis.

Conclusions: The incidence rate of TB among HIV-positive children after ART initiation was high. WHO clinical stage 3 and 4, a fair and poor adherence level to ART, > 3 months in HIV care before ART and < 6 months on ART were associated factors of tuberculosis. A study result suggest a need to give more attention for advanced clinical stages, initiation of ART, first six months on ART, and adherence to ART.

Keywords: Antiretroviral therapy; Children; HIV; Incidence; Tuberculosis; Ethiopia

Paper 4: Modeling on Longitudinal Blood Glucose and Time to Micro Vascular Complication on T2DM: the Case of Debre Markos and Felege Hiwot Referral Hospitals, Ethiopia

Negusse Gashaye

Abstract

Background: Micro vascular complication result in serious physical damages which may end up in death of T2DM patients. Studying the determinant factors of these complications and the trends of fasting plasma glucose may help save lives of citizens. The aim of this study was therefore to identify the determinant factors that affect the Progression change of blood glucose and time to micro vascular complication, by using both separate and joint longitudinal and survival Analysis.

Methods: A retrospective longitudinal cohort study was conducted in DM and FHRH located in DebreMarkous and Bahir Dar, Ethiopia. Records of patients enrolled between December 2011 and December 2012 were selected, and reviewed continuously until January 2017 using patients' anti T2DM drugs unique identification numbers as reference. The data was collected by four experienced nurses and supervised by one trained supervisors. Descriptive statistics were used to describe the frequencies and percentages of T2DM patients who have developed micro vascular complication across different groups while to describe the progression change of FBS we were used profile plot. The Kaplan-Meier survival curves and Log-Rank test were used to compare the survival experience of different group of T2DM patients. Separate and joint longitudinal and survival modeling techniques were used to identify the risk factors for the time to the development of Micro vascular complications and analyze trends in blood glucose level. The data were analyzed by using SAS 9.4 and R version 3.5 of JM package.

Results: the independent predictors of survival time of developing micro vascular complication for both Loglogistics and survival sub model at 95% CL were number of visit (CL: **0.934_0.958**), creatinine (Cl: **2.005_6.771**), macro vascular complication history (Cl: **0.272_0.927**), positive protein urea (Cl: **1.108_1.929**) and Weight (CL: **1.008_1.067**), whereas the independent predictors of progression change of log of FBS for both linear mixed and linear mixed sub model at 95% CL were time (CL: **-0.03553_-0.0228**), reside in Urban (CL: **-0.1116_-0.02117**), number of visit (CL: **-0.0053_-0.00205**), DBP (CL: **0.00027_0.0038**), SBP (CL: **0.0014_0.0038**), Baseline FBS with hypertension history (CL: **0.0002_0.0012**). Despite the fact that, Age (Cl: **-0.0042_-0.0012**), were independent predictor of change of log fasting plasma glucose only in linear mixed sub model.

Conclusion: from our finding, we concluded that base line fasting plasma glucose with hypertension history, systolic and diastolic blood pressure of the patients were positive associated with the progression change of fasting plasma glucose. On the other hand creatinine, positive protein urea and weight were positively associated with the time to the development of micro vascular complication.

Key words: Type2 diabetes mellitus, Micro vascular complication, blood glucose level, survival Analysis, longitudinal analysis, joint modeling

Paper 5: A Pair Copula Construction Cumulative Logit Model for Longitudinal Ordinal Data with Application to Household Food Insecurity Data

Jemal Ayalew

Abstract

Longitudinal data are collected for studying stability or changes over time. The main objective of this study is to introduce a new model that assesses the stability of ordinal outcomes over time and its associated factors simultaneously. A pair copula construction cumulative logit model was introduced using full maximum likelihood parameter estimation technique. The nice feature of this model in this setting is measuring the stability of ordinal outcome over time using the five candidate bivariate copula family parameter (Gaussian, Ali-Mikhail-Haq(AMH), Clayton, Gumbel and Frank) and the determinant factors using the parameters of the marginal distribution (Cumulative logit). Household food security status is one of the application areas satisfied all properties for this study. 671 farmerhousehold heads were interviewed three times at six month intervals from June, 2014 to June, 2015. 6% of households in the first two phases and 3% in the third phase were chronically food in-secured. 36% in the first two and 34% in the third were moderately food in-secured. 50% in the first two and 47% were mildly food in-secured. Moreover, 9% were food secured in the first two and 16% in last. Clayton, Gumbel and AMH copula families were selected as best for dependence measures between first and second, second and third, and first and third phases, respectively. The copula parameter showed the individual household food security status is not stable overtime. The marginal parameter showed crop disease and hot weathering condition are significant factor for households to be chronically food in-secured in all time points. Once yearly cultivation and market price increase are factors lead to chronically food in-secured for phase one and third, respectively. This model serves as alternative models for longitudinal ordinal outcomes and has additional feature than the exciting models.

Key words; chronically food in-secured, household, full maximum likelihood, cumulative logit, ordinal data, longitudinal data, pair copula construction

References

1. FAO, A. 2008. Introduction to the Basic Concepts of Food Security. Food Security Information for Action, Rome.
2. PANAGIOTELIS, A., CZADO, C. & JOE, H. 2012. Pair Copula Constructions For Multivariate Discrete Data. Journal of the American Statistical Association, 107, 1063-1072
3. PANAGIOTELIS, A., CZADO, C., JOE, H. & STÖBER, J. 2015. Model Selection for Discrete Regular Vine Copulas
4. RUSCONE, M. N. & OSMETTI, S. A. 2017. Modelling the Dependence in Multivariate Longitudinal Data by Pair Copula Decomposition. Soft Methods for Data Science. Springer.
5. SMITH, M., MIN, A., ALMEIDA, C. & CZADO, C. 2010. Modeling Longitudinal Data Using a Pair-Copula Decomposition of Serial Dependence. Journal of the American Statistical Association, 105, 1467-1479

Paper 6: A Longitudinal Data Analysis on Risk Factors For Developing Type-2 Diabetes Mellitus: A Case Study at Gondar Referral Hospital.

Melkamu Ayana

Abstract

Diabetes mellitus is a group of metabolic chronic diseases characterized by high blood sugar levels with multi-system complications which have burden of a crisis in terms of health care costs, both directly and indirectly. High blood sugar in long period of time can damage every major organ system like eye problem (blindness), skin problems, kidney disease and heart problems (stroke, congestive heart failure) which leads to amputations. This study seek to obtain the best predictive and applicable model for a type 2 diabetes patients' to reduce their RBS level from 330 patients with a minimum and a maximum repeated measure of 3 & 8 respectively in Gondar hospital for two year historical clinical data from the Diabetes Unit was used. The objective of this study was to assess the risk factor for developing type-2 diabetes mellitus over time in their Random Blood Sugar, to compare the effect of the risk factors among different socio demographic variables and explore the progression of the RBS of patients over time. To achieve this objective linear mixed effects model for longitudinal data analysis approach with random slope and random intercept model was used to measure the changes in RBS level using demographic, health and environmental related variables as explanatory variable. To select the significant study variables the backward elimination technique based on the p value and also use model comparison depending on the AIC & BIC value were applied to choose the best appropriate model. The analysis revealed that the linear distribution trend in the mean RBS level of the patients, accounting for 79% of the variability in the data and the mean RBS level of the patients was decrease over time after they starts the follow ups and their treatment . This study also confirm that the variable age, residence, family history, alcohol intake, dietary type, BMI, treatment, exercise and education level were the main determinant factors for the change in the level of mean RBS of the diabetes patients over time.

Keywords: Diabetes mellitus, linear mixed effect, Longitudinal Analysis and RBS.

SESSION 9

Paper 1: Lymphedema Management to Prevent Acute Dermatolymphangioadenitis in Podoconiosis (Golbet): A Pragmatic Randomised Controlled Trial in Northern Ethiopia

Henok Negussie, Meseret Molla, Moses Ngari, James A Berkley, Esther Kivaya , Patricia Njuguna , Greg Fegan, Abreham Tamiru , Abebe Kelemework , Trudie Lang, Melanie J Newport, Andy McKay , Fikre Enquoselassie , Gail Davey

Abstract

Background: Podoconiosis (endemic, non-filarial elephantiasis) affects an estimated 4 million subsistence farmers in tropical Africa. Limited awareness of the condition and lack of evidence for treatment means that no endemic-country government yet offers lymphedema management for podoconiosis patients. Among patients with filarial lymphedema, trials have suggested that limb care is effective in reducing the most disabling sequelae: acute dermatolymphangioadenitis (ADLA) episodes.

Methods: We conducted a pragmatic randomised controlled trial to test the hypothesis that a simple lymphedema management package would reduce the incidence of ADLA in adult podoconiosis patients in northern Ethiopia. Patients individually randomised to the intervention were instructed in foot hygiene, skin care, bandaging, exercises, and use of socks and shoes, and supported by lay Community Podoconiosis Agents at monthly meetings. Control patients were followed quarterly but received no intervention. The primary outcome was incidence of ADLA, measured using a validated patient-held pictorial diary. Patients were not masked to group assignment, but those performing analysis were. The trial was registered at the International Standard Randomised Controlled Trials Number Register, number ISRCTN67805210.

Findings: A total of 350 patients were randomised to the intervention and 346 to the control group. The follow-up rate was 93.4% at one year. During the 12 months of follow up, 16,550 new episodes of ADLA occurred during 765.2-person years observed. The incidence of ADLA was 19.4 (95% CI 18.9 to 19.9) and 23.9 (95% CI 23.4 to 24.4) episodes per person year in the intervention and control groups respectively, giving an incidence rate ratio of 0.81 (95% CI 0.69 to 0.96) and rate difference of -4.5 (95% CI -5.1 to -3.8) episodes per person year. No important adverse events were reported.

Interpretation: A simple, inexpensive package of lymphedema self-care is effective in reducing frequency and duration of ADLA. We recommend its implementation by endemic-country governments.

Paper 2: Volatility of Export Price of Coffee in Ethiopia

Atalaye N. Temesgen, Zeytu G. Asfaw and Demisew G. Degefu

Abstract

Ethiopia is credited as being the birthplace of Coffee. In Ethiopia, the export price of coffee is among the most volatile agricultural commodity prices. The researcher tried to identify factors that determine the volatility of export price of coffee in Ethiopia from January 2002 to June 2016. Most of the series considered in this study are non-stationary at level and stationary after first difference. The monthly return export prices of coffee had financial time series characteristics such as fat tail and leptokurtosis. Thus, the ARCH family models, GARCH and EGARCH models with ARIMA mean equations were fitted to the data. The best model was selected based on AIC and SBIC. Hence, ARIMA (1, 1, 1) -EGARCH (3, 1) with the normal error distribution assumption was selected as the asymmetric term was significant and the forecasting error was smaller. Among the exogenous variables considered in this study, fuel oil price, nonfood price, exchange rate and some seasonal dummies have statistically significant effect. The significance of the asymmetric term in EGARCH (3, 1) model indicates that an unanticipated increase in export price of coffee had the largest impact on price volatility than unanticipated decrease in the price. Additionally, past shock and lagged volatility of export price had statistically significant effect on the price volatility of coffee.

Keywords: Coffee, Export Price, Stationary, Volatility, ARIMA, EGARCH, Ethiopia.

Paper 3: Statistical models for longitudinal zero inflated count data: Application to Seizure Attacks

Haile Mekonnen, Demeke Lakew, Dereje Tesfaye, Prafulla K Swain

Abstract

Chronic non-communicable diseases, such as epilepsy, are increasingly recognized as important public health problems in developing countries. This study aimed at finding determinants of number of epileptic seizure attacks using different count data modeling techniques. Four common fixed effects Poisson family models were reviewed to analyze the count data with a high proportion of zeros in longitudinal outcome, i.e., number of seizure attacks in epilepsy patients. This is because in addition to the problem of extra zeros, the correlation between measurements upon the same patient at different occasions needs to be taken in to consideration. The investigation has been remarkably pointed out that the important factors associated with epileptic seizure attacks. As people become old, the number of seizure attacks increased and being male had more seizures than female patients. In general, the age, sex, monthly income, family history of epilepsy and service satisfaction was some of the significant factors responsible for the frequency of seizure attacks.

Key words: linear mixed model, hurdle model, seizure attacks, zero inflated models

Paper 4: Method-Mix of Contraception and its factors in Emerging regions of Ethiopia

Wondiber Nega, Delayehu Bekele, Alula Tekelu, Munior Kassa

Abstract

Background: The method-mix of contraceptive use is severely unbalanced in Ethiopia, where short act reversible contraceptive (SARC) dominantly used by many women's. These SARC are used inconsistently or have high discontinuation rates, expanding the contraceptive options through including longer-acting reversible implants and IUDs would pay useful dividends in reducing future unintended pregnancies. Hence, the objective of this study is to examine method-mix of contraceptives, and further to assess factors affecting using of these family planning services in the four emerging regions of Ethiopia.

Research Methods: A community based cross-sectional study was done from February to June 2017 in four emerging regions of Ethiopia. Structured questionnaire was used to interview 2891 reproductive age group of women, who were selected using multistage sampling technique. Multinomial logistic regression was applied in order to identify significant predictors of contraceptive method-mix at (P-value <0.05), and odds ratios with 95% confidence interval.

Result: Contraceptive prevalence rate in four regions was low (23.4%), in which Afar, Binishangul-Gumuz, Gambela and Somali regions showed 10.9%, 41%, 26,4% and 9.9%, respectively. Injectable has high coverage in all regions, and it accounts 50%, 50.2%, 78% and 22.4% of contraceptive uptake in Afar, BG, Gambela and Somali regions. The logistic regression result shows regional difference, religion affiliation, residence, number of children, and exposure for mass media are significant predictor on using SARC types. Long act reversible contraceptive were influenced by difference of age, religion, husband's education and region where women are currently living.

Conclusion: Improving method-mix of using contraceptive is important in the regions, through increasing the education level of women, intervention in rural areas, targeting Muslim population and women with large number of children and higher age groups.

Key words: Contraceptive Method-mix, Multinomial logistic regression, emerging regions, Ethiopia

Paper 5: Exploring trend and barriers of antenatal care utilization using data mining technique: proof from pooled Ethiopian DHS of 2000, 2005, 2011, and 2016

Kedir Hussein

Abstract

Background: In the healthcare industry, there are huge amounts of data available and these data are of no use until converted into useful information. Data mining is a field of big data science used to discover patterns and knowledge from these big data. This healthcare industry is paying attention to pregnancy and Antenatal care (ANC) for mothers. Thus, the presented study aimed at exploring the trend and identifying the barrier for ANC utilization of mothers in Ethiopia.

Methods: All the EDHS data from 2000 to 2016 were cleaned, pooled, and get ready for mining using STATA-14, and Waikato Environment for Knowledge Analysis (WEKA-3.7) was used for mining the dataset using classification algorithms (Tree structure, Statistical, and Neural network algorithms), clustering (Simple K-means algorithms), association rules (Apriori algorithms) and attribute ranking and pattern prediction (InfoGainAttributeEval with Ranker T algorithms)

Results: ANC utilization in 2000 was 18.35%, in 2005 it was 16.71%, in 2011 it was 27.61%, and in 2016 it was 37.33%. From the total of 28,631 mothers, 56.09% of them were not utilizing ANC during pregnancy. From the classification algorithms; Decision tree classified 73.25%, Naïve Bayes, 68.65%, and Multilayer perceptron, 70.13% of instances correctly. Pregnancy complication, the Educational status of mothers and husbands, Mothers' residence, economic status, and media exposure had an association with ANC utilization having a confidence level of 95% and above.

Conclusion: ANC utilization in Ethiopia was increased from 2000 to 2016. Despite the availability of maternal health care in Ethiopia, the proportion of ANC utilization is still low, the barriers for this low utilization were; Pregnancy complication, the Educational status of mothers and their husbands, Mothers' residence, economic status, and media exposure. Therefore, pregnant mothers have to attend ANC service at least four times even though she has no pregnancy complication. Education and poverty reduction are key strategic areas to be addressed in improving women's health care seeking behavior during pregnancy. Expansion of infrastructure among the rural communities having good media coverage needs to be prioritized to improve ANC service utilization.

Keywords: ANC, Data Mining, EDHS, Ethiopia, Pooled data

References

1. Han, J., M. Kamber, and J. Pei, eds. Data mining concepts and techniques. 3rd ed. Morgan Kaufmann Publishers. Waltham, Mass; 2013.
2. Abegaz K.H. and Atomssa E.M. Data Mining of Access to Tetanus Toxoid Immunization Among Women of Childbearing Age in Ethiopia. Machine Learning Research, 2017 2(2): 54-60.
3. The Henry J. Kaiser Family Foundation, Snapshots: Comparing projected growth in Healthcare expenditures and the economy. 2006. <http://www.kff.org/health-costs> Accessed 15 Dec 2016.
4. Ahmad P, Qamar S, Rizvi SQ. Techniques of data mining in healthcare: a review. International Journal of Computer Applications. 2015 Jan 1;120(15).

ESA 2018

27th Annual Conference of Ethiopian Statistical Association (ESA)

Theme: Statistical In-depth Analysis for Optimal Use of Data

The Role of Census Data for Evaluation and Analysis of SDGs



ETHIOPIAN STATISTICAL ASSOCIATION
የኢትዮጵያ ስታቲስቲክስ ባለሙያዎች ግንባር

0.1% 2.1% 13.6% 34.1% 34.1% 13.6% 2.1% 0.1%

-3σ -2σ -1σ μ 1σ 2σ 3σ

ETHIOPIAN STATISTICAL ASSOCIATION
Founded 1990

27th Annual Conference
March 24 - 25, 2018

CONFERENCE PROGRAM AND BOOK OF ABSTRACTS

March 24 - 25, 2018, Addis Ababa, Ethiopia

27th Annual Conference of
Ethiopian Statistical Association