



**Weill Cornell Medicine-Qatar**  
Continuing Professional Development

# **CERTIFICATE IN THE ANALYSIS OF MEDICAL DATA: APPLIED BIostatISTICS FOR HEALTH CARE PROFESSIONALS**



# CERTIFICATE IN THE ANALYSIS OF MEDICAL DATA: APPLIED BIOSTATISTICS FOR HEALTH CARE PROFESSIONALS

**January 27 & 28, 2023**

Introductory Applied Biostatistics  
for Health Care Professionals

**February 18, 2023**

Intermediate Applied Biostatistics  
for Health Care Professionals

**March 25, 2023**

Advanced Applied Biostatistics  
for Health Care Professionals



## Overview

### Certificate in the Analysis of Medical Data: Applied Biostatistics for Health Care Professionals

#### Description:

This is a series of three workshops (introductory, intermediate and advanced) aimed at enabling healthcare professionals (HCP) to organize, manage, and analyze their data and properly interpret and summarize its results. The workshops will be applied in nature where biostatistical concepts will be explained through case studies using a statistical software package, such as IBM-SPSS.

#### Gap Analysis/Need Assessment

Research is the main pillar for the advance of science and the improvement of healthcare for patients. Biostatistics plays a key role in research. Biostatistics is taught for students in many disciplines, such as business, engineering, social sciences, nursing, allied health, pharmacy and medicine. Healthcare workers from all disciplines and all levels are expected to participate in or read about research at some point in their career. A major obstacle for people undertaking research is the inability to find help with data analysis (DeMets et al, 2006). Moreover, inadequate knowledge of biostatistical methods and interpretation might yield sub-optimal and possibly incorrect results. It is thus important to have proper and continuous post-university training for doctors and healthcare professionals in biostatistics and its concepts (Okoro et al 2019, Ercan et al 2008). Researchers from different disciplines in Qatar, as represented by scientific committee members of this course, have indicated that training in applied biostatistics is needed for students, faculty members and healthcare practitioners in the various health

sectors in Qatar. This training will help researchers in Qatar improve their skills in research by being able to organize, manage and analyze their data. This could help increase research output in Qatar, with healthcare professionals equipped with the ability to analyze their data with minimal help, if any, from biostatisticians.

#### Overall Learning Objectives:

At the end of the three workshops, participants will be able to:

1. Enter and manage data using a statistical software
2. Perform bivariate analysis for both continuous and dichotomous outcomes
3. Perform multivariate analysis for both continuous and dichotomous outcomes
4. Perform simple analysis for survival data

#### Target Audience

Physicians, Nurses, Dentists, Pharmacists, Allied Health Professionals, Students, Researchers and Educators.



# Accreditation

## Disclosure of Relationships/Content Validity

It is the policy of Weill Cornell Medicine-Qatar to adhere to Ministry of Public Health’s Department of Healthcare Professions (DHP) and Accreditation Council for Continuing Medical Education (ACCME) Criteria, Policies, and Standards for Commercial Support and content validation in order to ensure fair balance, independence, objectivity, and scientific rigor in all its sponsored programs. All faculty participating in sponsored programs are expected to disclose relevant financial relationships pertaining to their contribution to the activity, and any discussions of off-label or investigational uses of approved commercial products or devices, or of any products or devices not yet approved in the United States and elsewhere. WCM-Q CME/CPD activities are intended to be evidence-based and free of commercial bias.

Course Directors	Scientific Planning Committee
Thurayya Arayssi, MD Ziyad R. Mahfoud, PhD	Mohammed Al-Saey, DDS Deema Al-Sheikhly, MEHP Maguy S El Hajj, PharmD Vahe Kehyayan, PhD Bruce MacRae, RT Stella Major, MD Daniel Rainkie, PharmD
Course Faculty	Course Administrator
Ziyad R. Mahfoud, PhD Deema Al-Sheikhly, MEHP Soha Dargham, MPH Ibtihal Kamal, Medical Student Padmakumari Sarada, MSc	Safia Rabia

The Course Director & Co-course Director, Scientific Planning Committee members, Faculty and Course Administrator:

- Have no relevant financial relationship to disclose.
- Will not be discussing unlabeled/unapproved use of drugs or products.

## Evaluation

An evaluation will be conducted online post activity. All participants are required to complete the Evaluation Form in order to qualify for a certificate. The evaluation allows us to assess the degree to which the activity met its objectives. It will also guide the planning of future activities and inform decisions about improving the educational program.

## Accreditation and Credit Designation Statements



### ACCME

The Weill Cornell Medicine-Qatar is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians

#### Introductory Applied Biostatistics for Healthcare Professionals

The Weill Cornell Medicine-Qatar designates this live activity for a maximum of 10.00 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

#### Intermediate Applied Biostatistics for Healthcare Professionals

The Weill Cornell Medicine-Qatar designates this live activity for a maximum of 6.50 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

#### Advanced Applied Biostatistics for Healthcare Professionals

The Weill Cornell Medicine-Qatar designates this live activity for a maximum of 7.00 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



### DHP

Weill Cornell Medicine-Qatar is accredited as a provider of Continuing Medical Education (CME) and Continuing Professional Development (CPD) by the Department of Healthcare Professions (DHP) of the Ministry of Public Health.

#### Introductory Applied Biostatistics for Healthcare Professionals

This activity is an Accredited Group Learning Activity (Category 1) as defined by the Department of Healthcare Professions -Accreditation Section and is approved for a maximum of 10.00 hours.

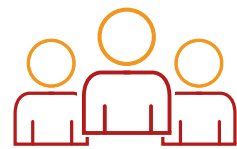
#### Intermediate Applied Biostatistics for Healthcare Professionals

This activity is an Accredited Group Learning Activity (Category 1) as defined by the Department of Healthcare Professions -Accreditation Section and is approved for a maximum of 6.50 hours.

#### Advanced Applied Biostatistics for Healthcare Professionals

This activity is an Accredited Group Learning Activity (Category 1) as defined by the Department of Healthcare Professions -Accreditation Section and is approved for a maximum of 7.00 hours.

*The scientific planning committee has reviewed all disclosed financial relationships of speakers, moderators, facilitators and/or authors in advance of this CPD activity and has implemented procedures to manage any potential or real conflicts of interest.*



# Scientific Planning Committee

## Course Directors



### **Thurayya Arayssi, MD**

Vice Dean for Academic and Curricular Affairs  
Professor of Clinical Medicine  
Weill Cornell Medicine-Qatar



### **Ziyad R. Mahfoud, PhD**

Professor of Research in Population Health Sciences  
Weill Cornell Medicine-Qatar

## Members



### **Mohammed Al-Saey, DDS**

Director of Sports Dentistry - Consultant in Oral Surgery  
Aspetar



### **Deema Al-Sheikhly, MEHP**

Director, Medical Education and Continuing Professional Development  
Lecturer of Education in Medicine  
Weill Cornell Medicine-Qatar



### **Maguy S El Hajj, PharmD**

Associate Professor and Head  
Qatar University College of Pharmacy



### **Vahe Kehyayan, PhD**

Assistant Professor  
University of Calgary in Qatar



### **Bruce MacRae, RT**

Critical Care Respiratory Therapy Consultant



### **Stella Major, MD**

Associate Professor of Family Medicine in Clinical Medicine  
Weill Cornell Medicine-Qatar



### **Daniel Rainkie, PharmD**

Quality Care Pharmacist, Pharmacists in PCN Program  
Lecturer, Faculty of Pharmaceutical Sciences  
The University of British Columbia, Vancouver Campus, Canada



# Program

Online via Zoom and Face-to-Face at WCM-Q

January 27-28, 2023

## Introductory Applied Biostatistics for Health Care Professionals

### Overall Learning Objectives:

At the end of this activity, participants will be able to:

1. Use IBM-SPSS to enter, code and manage data
2. Summarize variables both in numbers and graphs
3. Use IBM-SPSS to apply basic analysis of numeric outcomes and categorical outcomes

### Agenda

Time	Topic	Session Learning Objectives	Speaker
<b>Day 1 (Friday)</b>			
1:30 pm - 2:00 pm	Opening remarks, accreditation and pre-test	Identify current knowledge pertaining to basics of applied biostatistics.	<b>Dr. Ziyad R. Mahfoud</b>
2:00 pm - 3:30 pm	Creating a data base in IBM-SPSS	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Demonstrate an understanding of IBM-SPSS software interface.</li> <li>2. Create a data base in IBM-SPSS.</li> <li>3. Produce data for different types of variables.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>
3:30 pm - 4:00 pm	Break		
4:00 pm - 5:30 pm	Descriptive Statistics in IBM-SPSS	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Compute descriptive statistics.</li> <li>2. Demonstrate how to stratify analysis.</li> <li>3. Demonstrate how to select a certain group of patients from a data base.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>
<b>Day 2 (Saturday)</b>			
9:00 am - 10:30 am	Basic Data Management and Graphical Display of your data in IBM-SPSS	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Manage data by creating new variables, recoding variables, and do data arithmetic.</li> <li>2. Illustrate data using appropriate graphs.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>

Time	Topic	Session Learning Objectives	Speaker
10:30 am - 11:00 am	Break		
11:00 am - 1:15 pm	Analysis of numeric outcomes in IBM-SPSS	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Compute confidence interval for one mean and difference between two independent means.</li> <li>2. Analysis data using one sample t-test, paired t-test and independent t-test.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>
1:15 pm - 2:15 pm	Lunch break		
2:15 pm - 3:30 pm	Analysis of dichotomous or categorical outcomes in IBM-SPSS	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Compute the confidence interval for a proportion and difference between two independent proportions.</li> <li>2. Analyze data using binomial test, Chi-squared test, Fisher's exact test, McNemar's test.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>
3:30 pm - 4:00 pm	Coffee break		
4:00 pm - 5:00 pm	Case study: analysis for a 2 parallel arm clinical trial	At the end of this session, participants will be able to: <ol style="list-style-type: none"> <li>1. Create suitable demographic and clinical characteristic summary table for a clinical trial.</li> <li>2. Run the most appropriate analysis for the outcomes in a 2 parallel arm clinical trial.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>  <b>Facilitators:</b> <b>Ms. Deema Al-Sheikhly</b> <b>Ms. Padmakumari Sarada</b>
5:00 pm - 5:30 pm	Wrap up and post-test	<ol style="list-style-type: none"> <li>1. Evaluate to which extent the learning objectives were met.</li> <li>2. Summarize the key learning points.</li> </ol>	<b>Dr. Ziyad R. Mahfoud</b>



# Program

Online via Zoom and Face-to-Face at WCM-Q

February 18, 2023

## Intermediate Applied Biostatistics for Health Care Professionals

### Overall Learning Objectives:

At the end of this activity, participants will be able to:

1. Fit a linear regression to examine the relationship between a numeric dependent variable and one or more independent variables
2. Fit a logistic regression to examine the relationship between a dichotomous dependent variable and one or more independent variables
3. Test for interaction in regression
4. Assess confounding in regression

### Agenda

Time	Topic	Session Learning Objectives	Speaker
9:00 am – 9:15 am	Pre-test	Identify current knowledge pertaining to biostatistical concepts that will be covered in the current training.	Dr. Ziyad R. Mahfoud
9:15 am – 10:15 am	Review material from first training a. Descriptive statistics b. Analysis of numeric variables c. Analysis of categorical variables	At the end of this session, participants will be able to: 1. Compute descriptive statistics. 2. Demonstrate an understanding of analysis of numeric and categorical variables.	Dr. Ziyad R. Mahfoud  <b>Facilitators:</b> Ms. Soha Dargham Ms. Ibtihal Kamal
10:15 am – 11:45 am	Introduction to Regression a. Simple linear regression b. Simple logistic regression	At the end of this session, participants will be able to: Apply a simple linear regression and simple logistic regression to analyze their data.	Dr. Ziyad R. Mahfoud  <b>Facilitators:</b> Ms. Soha Dargham Ms. Ibtihal Kamal
11:45 am – 12:15 pm	Break		
12:15 pm – 1:15 pm	Important concepts in Regression a. Confounding b. Interaction c. Overfitting or underfitting in regression	At the end of this session, participants will be able to: 1. Demonstrate an understanding of how to account for confounding variables in regression. 2. Demonstrate an understanding of interaction and how to test for it in regression. 3. Demonstrate an understanding of overfitting and underfitting in regression.	Dr. Ziyad R. Mahfoud  <b>Facilitators:</b> Ms. Soha Dargham Ms. Ibtihal Kamal

Time	Topic	Session Learning Objectives	Speaker
1:15 pm – 2:15 pm	Lunch break		
2:15 pm – 3:30 pm	Multiple linear regression a. Analysis of the full Model b. Confounding interaction and collinearity in linear regression	At the end of this session, participants will be able to: 1. Employ multiple linear regression to analyze a full model. 2. Demonstrate an understanding of confounding, interaction and collinearity in linear regression.	Dr. Ziyad R. Mahfoud  <b>Facilitators:</b> Ms. Soha Dargham Ms. Ibtihal Kamal
3:30 pm – 4:00 pm	Break		
4:00 pm – 5:15 pm	Multiple logistic regression a. Analysis of the full Model b. Confounding interaction and collinearity in logistic regression	At the end of this session, participants will be able to: 1. Employ multiple logistic regression for the analysis of the full model. 2. Demonstrate an understanding of confounding, interaction and collinearity in logistic regression.	Dr. Ziyad R. Mahfoud  <b>Facilitators:</b> Ms. Soha Dargham Ms. Ibtihal Kamal
5:15 pm – 5:30 pm	Wrap up and post-test	1. Evaluate to which extent the learning objectives were met. 2. Summarize the key learning points.	Dr. Ziyad R. Mahfoud





# Program

Online via Zoom OR Face-to-Face at WCM-Q

Mar 25, 2023

## Advanced Applied Biostatistics for Health Care Professionals

### Overall Learning Objectives:

At the end of this activity, participants will be able to:

1. Generate a multiple linear regression
2. Generate a multiple logistic regression
3. Analyze data from a one-way ANOVA
4. Analyze data using nonparametric statistics
5. Fit a Kaplan Meier Curve and compute median survival
6. Interpret Hazard Ratios and their confidence intervals

### Agenda

Time	Topic	Session Learning Objectives	Speaker
8:30 am - 9:00 am	Registration		
9:00 am - 9:30 am	Pre-test	Identify current knowledge pertaining to biostatistical concepts that will be covered in the current training.	Dr. Ziyad R. Mahfoud
9:30 am - 10:45 am	Review material from first and second training a. Descriptive statistics b. Analysis of numeric variables c. Analysis of categorical variables	At the end of this session, participants will be able to: 1. Compute descriptive statistics. 2. Demonstrate an understanding of analysis of numeric and categorical variables. 3. Employ multiple linear regression to analyze a full model. 4. Employ multiple logistic regression to analyze a full model.	Dr. Ziyad R. Mahfoud  Facilitators: Ms. Soha Dargham Ms. Ibtihal Kamal

Time	Topic	Session Learning Objectives	Speaker
10:45 am - 12:15 pm	Selecting variables for multiple regression a. Computer based methods b. Other methods c. Application	At the end of this session, participants will be able to: 1. Employ forward, backward and stepwise methods of variables selection for linear and logistic regression models. 2. Employ other methods of variables selection for linear and logistic regression.	Dr. Ziyad R. Mahfoud  Facilitators: Ms. Soha Dargham Ms. Ibtihal Kamal
12:15 pm - 12:30 pm	Break		
12:30 pm - 1:30 pm	One way ANOVA a. Understanding the ANOVA table b. Multiple testing model c. How does it work with categorical variables	At the end of this session, participants will be able to: 1. Employ one-way ANOVA and multiple testing procedures for numeric variables. 2. Employ Chi-squared test for multiple groups with pairwise comparison procedures.	Dr. Ziyad R. Mahfoud  Facilitators: Ms. Soha Dargham Ms. Ibtihal Kamal
1:30 pm - 2:00 pm	Break		
2:00 pm - 3:15 pm	Nonparametric tests a. For bivariate analysis b. For one way ANOVA	At the end of this session, participants will be able to: 1. Demonstrate an understanding of the difference between parametric and non-parametric tests. 2. Apply nonparametric tests such as Wilcoxon's signed rank test, rank sum test, and the Kruskal Wallis test.	Dr. Ziyad R. Mahfoud  Facilitators: Ms. Soha Dargham Ms. Ibtihal Kamal
3:15 pm - 3:30 pm	Break		
3:30 pm - 4:45 pm	Introduction to Survival Analysis a. Kaplan Meier Method and Curve b. Log Rank test and Hazard Ratio	At the end of this session, participants will be able to: 1. Demonstrate an understanding of the concept of time to event and censoring. 2. Apply Kaplan Meier method to obtain survival estimates and curves. 3. Employ the log rank test. 4. Demonstrate an understanding of the concept of hazard ratio.	Dr. Ziyad R. Mahfoud  Facilitators: Ms. Soha Dargham Ms. Ibtihal Kamal
4:45 pm - 5:00 pm	Wrap up and post-test	1. Evaluate to which extent the learning objectives were met. 2. Summarize the key learning points.	Dr. Ziyad R. Mahfoud



**Ziyad R. Mahfoud, PhD**  
Professor of Research in Population Health Sciences  
Weill Cornell Medicine-Qatar

Dr. Mahfoud is an Associate Professor of Biostatistics and Healthcare Policy and Research at Weill Cornell Medicine-Qatar (WCM-Q). Prior to coming to WCM-Q in September 2010, he served as an Assistant Professor in the Department of Statistics and School of Public Health of the University of Kentucky (2001-2004) and an Assistant and Associate Professor in the Department of Epidemiology and Population Health at the American University in Beirut (2004-2010). Dr. Mahfoud holds a PhD in statistics from the University of Florida. Dr. Mahfoud's research interests focus mainly on tobacco use, mental health, and medical education. He is particularly interested in youth and tobacco, pregnancy and tobacco, and validation of mental health scales. Also, he has published in the area of HIV among most at-risk populations. He is currently the principal investigator and co-principal investigator on several grants looking at epidemiology of epilepsy in Qatar, finding alternatives to informed consent in Qatar, and evaluating school interventions for prevention and cessation of shisha smoking. He also supports several faculty members in the design, conduct, and analysis of research projects. Dr. Mahfoud initiated and participated in several training workshops for medical students, research assistants and associates, residents, and fellows on topics such as epidemiology, biostatistics, evaluating published medical articles and evidence based medicine.



**Soha Dargham, MPH**  
Senior Biostatistician  
Weill Cornell Medicine-Qatar

Soha Dargham is a Senior Biostatistician at Weill Cornell Medicine-Qatar. She is the lead statistician for several ongoing projects and has presented several introductory biostatistics workshops for research staff and medical interns. Her aims as a biostatistician and researcher have been to deliver high-quality statistical analyses and results while also aspiring to be a product-oriented researcher. Having spent more than seven years in the research industry, Soha research skills and acquired knowledge are used in ways that improve, promote, and expand the research. She enjoys translating the numbers and data statistics into stories and identifying research priorities, which in turn can be used by clinicians, health policy makers, and the public to make evidence-based decisions in the realm of public health. Soha earned her BSc from the University of Wisconsin-Madison, USA, and her MPH from the American University of Beirut, Lebanon. She is fluent in English, Arabic and French.



**Deema Al-Sheikhly, MEHP**  
Director, Director, Medical Education and Continuing Professional Development  
Lecturer of Education in Medicine  
Weill Cornell Medicine-Qatar

Ms. Deema Al-Sheikhly is a Lecturer of Education in Medicine and the Director of Medical Education and Continuing Professional Development at Weill Cornell Medicine-Qatar (WCM-Q). In this role, she provides oversight for the development, direction and coordination of the business, financial and operational functions of both divisions.

Ms. Al-Sheikhly joined WCM-Q in 2006 as Clinical Curriculum Administrator and was later appointed Manager of Graduate Medical Education. Part of her role included supporting WCM-Q's affiliate hospital in restructuring the residency programs to meet the ACGME-I accreditation standards, where she was instrumental in developing an Internal Review process, which was highly commended by the ACGME-I. In 2014, she was appointed Director of Continuing Professional Development, responsible for directing the overall educational program and maintaining the division's mission and strategic plan as well as providing strategic oversight for the development and maintenance of the organizational operations of the division. She also co-led the division in attaining local recognition of WCM-Q as a provider of continuing medical education (CME) and continuing professional development by the Department of Healthcare Professions as well as International recognition by the Accreditation Council for Continuing Medical Education (ACCME) as a provider of CME for physicians.

Furthermore, Ms. Al-Sheikhly has developed and taught in a variety of educational programs and presented and published in the area of undergraduate, graduate and continuing medical education. Ms. Al-Sheikhly earned her Bachelor of Science (Hons) in Biotechnology from Kings College London, Master of Research in Bioprocessing from University College London and Master of Education in the Health Professions from Johns Hopkins University, USA.



# Faculty



## **Ibtihal Kamal**

**First-year Medical Student and MD Candidate, Class of 2026**  
**Weill Cornell Medicine-Qatar**

Ibtihal Kamal is currently a first-year medical student at Weill Cornell Medicine-Qatar. She was born and raised in New York, USA. Ibtihal has experience with the statistical software IBM-SPSS through coursework and research.



## **Padmakumari Sarada, MSc**

**Teaching Specialist in Math and Statistics**  
**Weill Cornell Medicine-Qatar**

Ms. Sarada is a Teaching Specialist in Math and Statistics at Weill Cornell Medicine-Qatar and previously served as Learning Lab Specialist in the science program at Texas A&M University at Qatar. She holds master's degrees in mathematics and statistics, and a bachelor of education degree from Kerala University, India. Ms Sarada is currently pursuing a PhD in education at the Richard W. Riley College of Education and Leadership, USA.



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