



SUMMER TRAINING REPORT

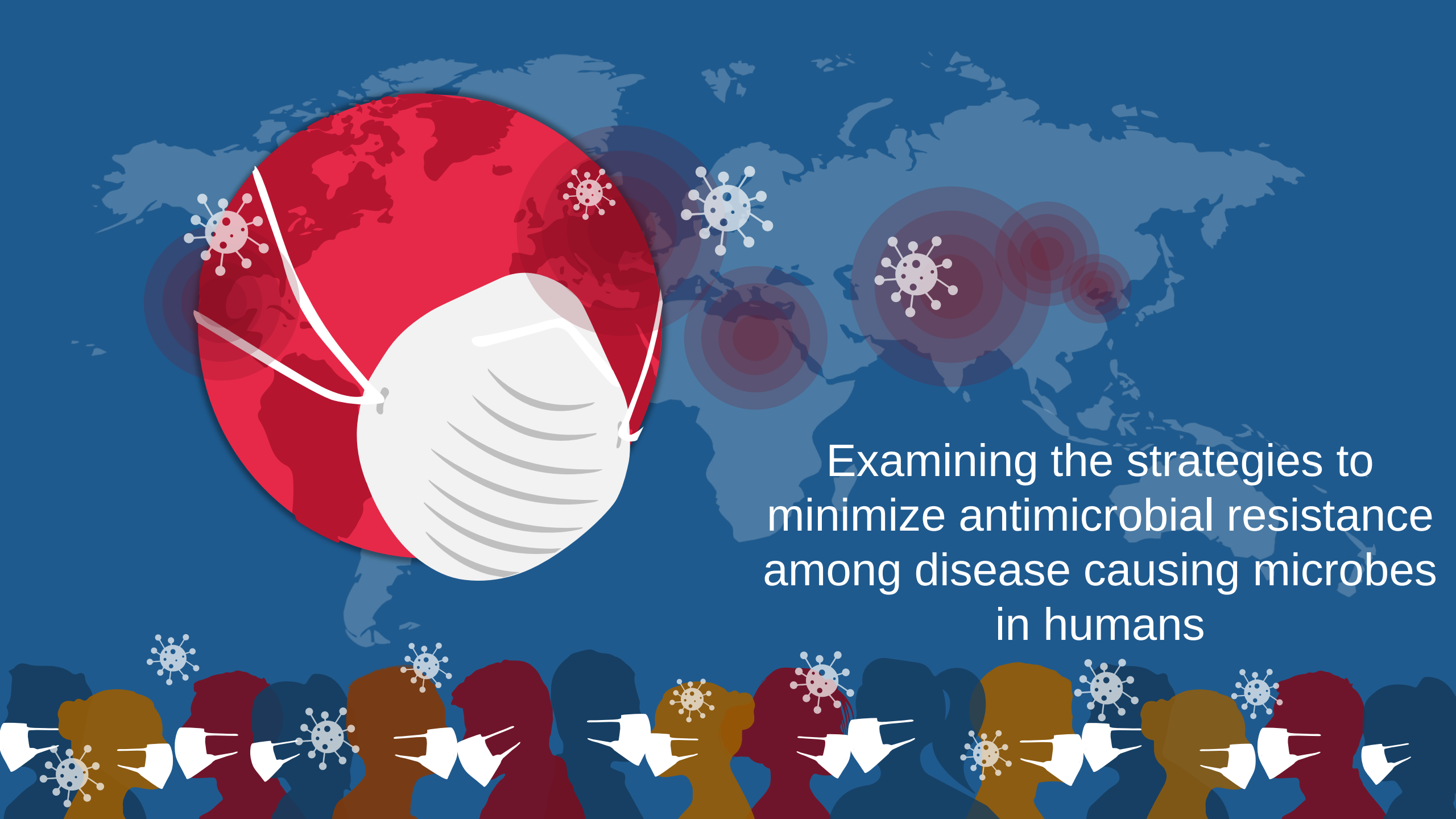
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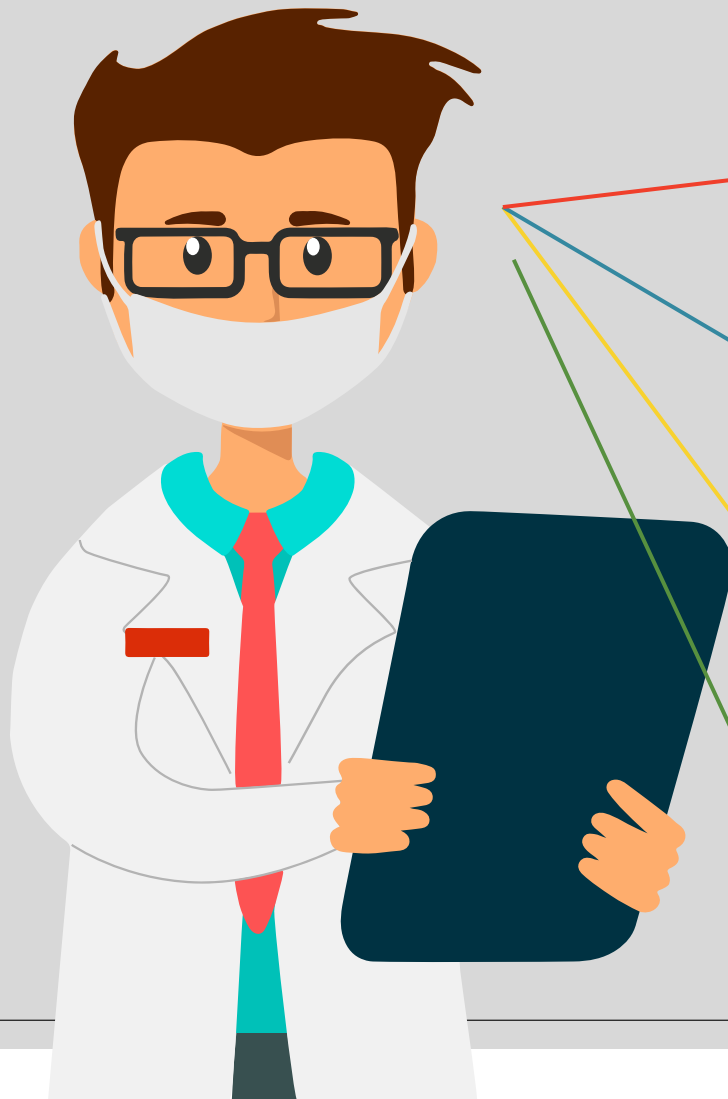
ACRONYMS/ABBREVIATIONS

- **AMR** – Antimicrobial Resistance
- **ASP** – Antimicrobial Stewardship Program
- **FDA** – Food and Drug Administration
- **CDC** – Center for Disease Control
- **GP** – General Practitioner
- **PRISMA** - Preferred Reporting Items for Systematic Reviews and Meta-Analyses
- **PICO** - P – Patient, Problem or Population. I – Intervention. C – Comparison, control, or comparator. O – Outcome(s) (e.g. pain, fatigue, nausea, infections, death)
- **MDR** – Multi-drug resistance
- **MDRO** – Multidrug Resistant Organism
- **PD** - Pharmacodynamic
- **PK** - Pharmacokinetic
- **TDR** – Total Drug Resistance
- **XDR** – Extremely Drug resistant Format properly



Examining the strategies to
minimize antimicrobial resistance
among disease causing microbes
in humans

Part 1 – Summer Training - WFH



Problem Statement



Examining the strategies to minimize antimicrobial resistance among disease causing microbes in humans.

Background



Implementation of effective and accurate strategies are the need of the hour to combat antimicrobial resistance among humans. As it is a rising global threat to public health, the strategies involved should be efficient in nature in terms of health and cost. It should parameterize cost-effectiveness evaluations of interventions which are specifically aiming to tackle this problem.

Methodology



Google Scholar, PubMed, researchgate.net, hindawi.net are among many of the websites which were used along with the grey literature involved in those research papers. The PRISMA guidelines were followed and a modified version of PICO inclusion/exclusion criteria was followed for screening titles and abstracts, among others

Conclusion



This study highlights the different strategies which are used worldwide and are recommended by WHO to effectively combat the growing incidences of Antimicrobial Resistance

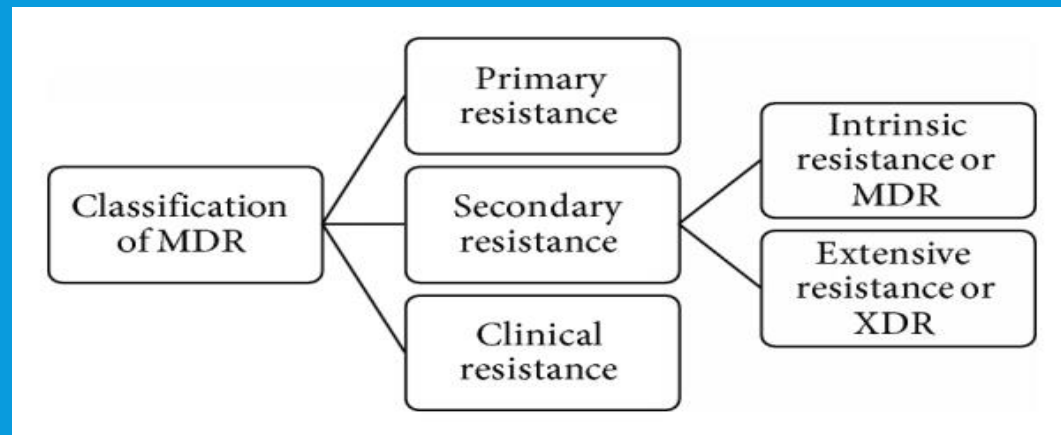
Column Style

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Introduction & Background

The ability of a disease-causing microbe to successfully resist the effects of medication that could previously treat it is known as *Antimicrobial Resistance (AMR)*. Some microbes that are resistant to multiple antimicrobials, these are referred to as *Multidrug-Resistant*.

A comparably rare type of microbials also exist, these are considered *Extensively Drug-Resistant (XDR)* or *Totally Drug-Resistant (TDR)* and sometimes also called “superbugs”.



- During recent decades, antimicrobials have become the cornerstones of clinical medicine. However, during the same period, the incidence of microbial infections has increased dramatically causing the emergence and spread of antimicrobial resistance in pathogens around the world. Among the many factors, high consumption of antimicrobials has been identified as an important driver for increasing AMR. Thus, elevating it as one of the greatest threats to public health globally.
- To address the problem of AMR, implementation of effective strategies is necessary. Some of which are listed as follows:
 - The Development of Novel Antimicrobials
 - Adequate Antimicrobial Prescribing
 - Education of Patients
 - Antimicrobial Stewardship Programs (ASP)
 - Disinfection and Hygiene in Hospitals

Criteria	Inclusion	Exclusion
Population	Humans - All Ages - All Sexes - Infection with Antimicrobial Resistant organism	Animals Plants
Intervention	Not Applicable	Not Applicable
Comparator	Not Applicable	Not Applicable
Outcomes	• Associated health burden, to include but restricted to: Mortality and Morbidity. • Associated healthcare cost burden, to include but not restricted to: Resource use and Opportunity cost. • Economic burden, including loss of productivity. • Burden from not being able to use antibiotics in ways previously or currently used in healthcare, including reduced surgery or chemotherapy.	Health-related quality of life only Molecular Biology only Epidemiology only Outcomes associated with the evaluation of an intervention such as clinical cure rate only
Study Design	Case–control studies , Cohort studies, Cross–sectional studies , Longitudinal studies, Randomized controlled trials, Modelling studies, Economic Evaluations	Editorials, Letters, Case series reports, Conference Reports, Evaluations of interventions, Reviews
Other	English Language	

TABLE FOR
INCLUSION/EXCLUSION
CRITERIA

The given modified PICO inclusion/exclusion criteria were utilized to screen title/abstracts and subsequently full texts.

B) Data quality assessment

- Risk of bias in individual studies will be assessed.
- Risk of bias across studies will be assessed in two groups; studies looking at health burden and studies looking at all other burden and will simply be assessed based on the nature and significance of the outcome. This is due to the expected heterogeneity in studies (outcome, infection, resistance).

C) Data Analysis

- No meta-analysis was performed due to heterogeneity nature of the study.
- The following information was extracted: study identifiers, study characteristics, data setting. Study methodology, outcome of interest, results, stated limitations and information used for risk bias assessment.

Literature Review



ARTICLE 1

- **REVIEW ARTICLE** - Multidrug resistance: an emerging crisis.
- **AUTHORS** - Tanwar, J., Das, S., Fatima, Z., & Hameed
- **PUBLISHED AT** - *Interdisciplinary perspectives on infectious diseases*
- **FOCUS** - Multi-drug Resistant microbes are growing in number. The research on remedial solutions to combat this is the need of hour and this study rightly shows the different ways with which combat against this growing threat to public health can be done
- **REMARKS/CONCLUSION** - It was found that almost all the capable infecting agents (e.g., bacteria, fungi, virus, and parasite) have employed high levels of multidrug resistance (MDR) with enhanced morbidity and mortality; thus, they are referred to as “super bugs.” Considering the significance of MDR, this paper, emphasizes the problems associated with MDR and the need to understand its significance and mechanisms to combat microbial infections.

ARTICLE 2

- **REVIEW ARTICLE** - Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem
- **AUTHORS** - Llor, C., & Bjerrum, L
- **PUBLISHED AT** - *Therapeutic advances in drug safety*
- **FOCUS** - This study focuses on the fact that over-prescribing antibiotics does tend to decrease its effectiveness in the short run. It tries to describe different methods/ways that General Practitioners (GP) can use to avoid this problem cropping up from their end in future.
- **REMARKS/CONCLUSION** - It was found that there was no reason to explain why the antibiotic prescribing in respiratory tract infections (the most frequent primary care) is so great. Moreover, we know that antibiotics can stop being effective in the short and medium term. The use of the strategies discussed in this paper will help GPs to reduce prescribing of antibiotics. Our duty is to prescribe antibiotics only when they are necessary, i.e. in less than 20% of the infectious seen in primary care.

ARTICLE 3

- **REVIEW ARTICLE** - Strategies to minimize antibiotic resistance
- **AUTHORS** - Lee, C. R., Cho, I. H., Jeong, B. C., & Lee, S. H.
- **PUBLISHED AT** - *International journal of environmental research and public health*
- **FOCUS** – Antibiotic resistance is growing threat to the global public health. This can be seen by the growing number of antibiotic resistant microbes. Steps need to be taken to combat this effectively.
- **REMARKS/CONCLUSION** - Antibiotic Resistance can be reduced by using antibiotics prudently based on ASPs and utilizing various data such as PK and PD and properties of antibiotics, among others.

ARTICLE 4

- **REVIEW ARTICLE** - Etiology and antibiotic resistance patterns of community-acquired urinary tract infections in JNMC Hospital Aligarh, India
- **AUTHORS** - Akram, M., Shahid, M., & Khan, A. U.
- **PUBLISHED AT** - *Annals of clinical microbiology and antimicrobials*
- **FOCUS** - The aim of this study was to determine the distribution and antibiotic susceptibility patterns of bacterial strains isolated from patients with community acquired urinary tract infections (UTIs) at Aligarh hospital in India as well as identification of ESBL producers in the population of different uropathogens.
- **REMARKS/CONCLUSION** - This study revealed that *E. coli* was the predominant bacterial pathogen of community acquired UTIs in Aligarh, India. It also demonstrated an increasing resistance to Co-trimoxazole and production of extended spectrum β -lactamase among UTI pathogens in the community. This study is useful for clinician to improve the empiric treatment.

ARTICLE 5

- **REVIEW ARTICLE** - Understanding, predicting, and manipulating the genotypic evolution of antibiotic resistance
- **AUTHORS** - Palmer, A. C., & Kishony, R.
- **PUBLISHED AT** - *Nature Reviews Genetics*
- **FOCUS** - To study the evolution of antibiotic resistance which can now be rapidly tracked with high-throughput technologies for bacterial genotyping and phenotyping.
- **REMARKS/CONCLUSION** - In this study they found that on combining these new technologies with new approaches the resistance can be evolved in labs and characterized to predict future evolution among pathogens. These methods are revealing the molecular basis and rate of evolution of antibiotic resistance under treatment regimens of single drugs or drug combinations.

DISCUSSION AND CONCLUSION

- Early in the 1950s, many falsely believed in point that bacterial diseases were no longer a threat.
- They were unaware about the evolving nature of the bacteria.
- Same beliefs still followed by prominent people in today's day and age.
- Lack of new drugs cased bacteria to gain resistance, even though treatments have improved.
- Antimicrobial Resistance (AMR) sees gradual increase over the last two decades.
- To manage AMR, continuous efforts to educate the public is important.
- Not just limiting to medical professionals and adults, but also children.



LIMITATIONS

01

Limited access to data

02

Lack of available and/or reliable data

03

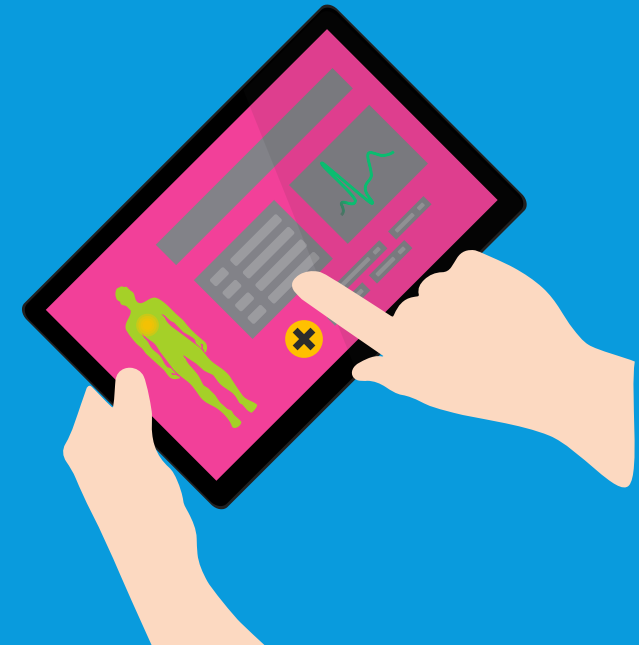
Presence of self-reported data

04

Cultural Bias

RECOMMENDATIONS

- Ignorant about basic hygiene – Hand wash
- Well conducted education – Antimicrobial Stewardship
- Enforcement of Governmental Laws prohibiting the over-the-counter sale of antibiotics.
- Advising General Practitioners about prescribing mindfully
- Valid rapid-point-of-care tests
- Enhanced communication with patients about illness.



PART 2 – REPORT ON ONLINE COURSE

- **Name of the Course** – The Fundamentals of Digital Marketing
- **Course Description** – This course is part of the “*Google Digital Unlocked*” platform. It is designed to help students master the basics of digital marketing with their free *Interactive Advertising Bureau*-accredited course. There are 26 modules to explore, all created by Google trainers. It filled with practical exercises and real-world examples to help students turn knowledge into action.



OBJECTIVES OF THE COURSE

- Teach students the key-insights gained from analyzing data.
- Engage the customers online in a way that markets one's presence.
- Create a detailed business strategy that will help in gaining more customers.
- Introduce students to different types of search ads
- How to optimize the Web so that more visibility can be attained
- Optimize content for the Mobile Web
- Marketing via E-Mail and on other websites
- Deep understanding of Display Advertising
- Introduction to video content for advertising and marketing
- Introduction to E-Commerce
- Optimizing content for the international audience.



COURSE CONTENTS

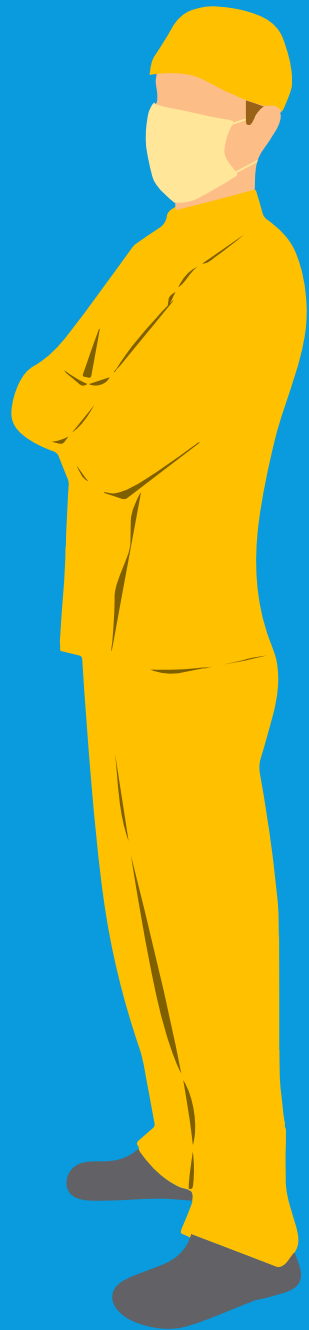
- *The Online Opportunity*
 - Introduction to Digital Unlocked
 - The Digital Opportunity
- *First Steps Online*
 - Online Goals
 - Building online presence
 - Marketing online presence
 - Analyze and Adapt
- *Build web presence*
 - Choosing online presence
 - How websites work
 - Website key points
 - Websites and student's business goals
 - Making one's website easy to use
 - Website design do's and don'ts
- *Planning online business strategy*
 - The benefits of an online strategy
 - Taking a business online
 - Understanding customer behavior
 - How to stand out from the competition
 - Using goals to improve business performance
- *Get Started with search*
 - Search engine basics
 - How search engines work
 - How search engines see the web
 - Organic search explained
 - Paid search explained
 - Google Search Console
- *Get Discovered with search*
 - Introduction to Search engine Optimization (SEO)
 - The importance of an SEO plan
 - The SEO process
 - How to choose keywords
 - Setting realistic SEO goals
- *Make Search work for you*
 - Making web pages search friendly
 - How other websites can work for you
 - Cross borders with SEO
- *Be noticed with Search ads*
 - Introduction to search engine marketing (SEM)
 - The SEM auction
 - What makes a good keyword?
 - Make your ads stand out



- *Improve your search campaigns*
 - Achieve relevance with good structure
 - Get the most from your keywords
 - Fine-tune with keywords match types
 - How to know what is working and what is not
- *Get noticed locally*
 - Marketing to the locals
 - The power of local directories
- *Help people nearby find you online*
 - Using digital to advertise locally
 - Reaching locals on their mobiles
 - SEO for local businesses
- *Get noticed with social media*
 - Social media basics
 - The right social media sites for you
 - Setting your goals for social media
 - Getting on social media
- *Deep dive into social media*
 - Your long-term social media plan
 - Advertising on social media
 - Measuring success in social media
 - Avoiding social media pitfalls



- *Discover the possibilities of mobile*
 - The evolution of mobile devices
 - Understanding mobile web and mobile apps
 - Understanding mobile apps
- *Make Mobile work for you*
 - Introduction for advertising on mobile
 - Search campaigns for mobile
 - Display campaigns for mobile
 - Social media campaigns for mobile
 - Video for mobile
- *Get started with content marketing*
 - Introduction to content marketing
 - Get to know your online customers
 - Choosing the right format for your content
 - Writing for online audiences
 - Help your content be seen
 - Measuring your success in content marketing
- *Connect through email*
 - Email marketing basics
 - Your email marketing options
 - Crafting great marketing emails
 - Managing successful email campaigns
 - Measuring success in email marketing



- *Advertise on other websites*
 - What is display advertising?
 - Search advertising vs. Display advertising
 - The ins and outs of display advertising
- *Deep dive into display advertising*
 - Making display ads meet your goals
 - Understanding ad networks
 - How retargeting works
- *Make the most of video*
 - The rise of online video
 - How video fits into your online strategy
 - Creating video content within your budget
 - Sharing and promoting your videos
 - Advertising on video sharing sites
 - Measuring video performance
- *Get started with analytics*
 - What are web analytics?
 - Making web analytics work for you
 - Tracking specific goals with web analytics
- *Find success with analytics*
 - Web analytics and organic search
 - Tools to measure SEM
 - Breaking down your data for insights
- *Turn data into insights*
 - Using data to understand audiences
 - Understanding the Data Cycle
 - Creating actionable insights from your data
 - Managing numbers using spreadsheets
 - Presenting data effectively
- *Build your online shop*
 - Using e-commerce to sell
 - Taking payments and manage orders
- *Sell more online*
 - Creating a smooth e-commerce experience
 - Product promotion and merchandising
 - Retargeting for e-commerce
- *Expand internationally*
 - Introduction to international marketing and export
 - Validating your new market
 - Being understood abroad
 - Advertise across borders
 - The support systems you will need
 - Helping customers abroad buy your products
 - Delivering to customers across the globe.

LEARNING METHODOLOGY

- There was an abundance of lectures in video format.
- They also judiciously used case studies when needed as an example for explanation of different parts of theory.
- Some reading material was available in the form of pdf.
- It was extra reading material for subjects they had already covered, thus ensuring in providing a deeper understanding of the topic.

KEY LEARNING FROM THIS COURSE

- This course has some important key learning which are as follows:
 - It explains the fundamentals of analytics and data insights
 - It explains how to formulate an effective business strategy
 - It explains how to create and market content
 - It goes into the depths of Display advertising
 - It teaches how to appropriately utilize E-Commerce.
 - It advises on how to effectively manage email marketing.
 - It explains the importance of local marketing
 - It explains the Mobile web, that is, utilization of web services specific to mobile users.
 - It explains Search Engine Marketing (SEM)
 - It explains Search Engine Optimization (SEO)
 - It teaches the appropriate usage of Social Media
 - It advises on creating quality video content
 - It also focuses on Web Optimization.

