

Evaluation of a Distance-Based Training Program on Health Information Management and
Applied Epidemiology (HIMAE) in South Africa

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Abstract

Evaluation of a Distance-Based Training Program on Health Information Management and Applied Epidemiology (HIMAE) in South Africa

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Background:

Health Information Systems (HIS) are used to provide accurate, timely and reliable data for disease surveillance, policy-making, program evaluation, and resource allocation at all levels of a national health system. One reason for poor performance of the South Africa HIS is a lack of appropriately trained health care workers. E-learning has been identified as one feasible option to address this gap. This paper evaluates a distance-based Health Information Management and Applied Epidemiology (HIMAE) course designed to train front-line health care and public health workers in South Africa.

Methods:

The HIMAE course was piloted in 3 provinces in South Africa. Participants alternated between e-learning and workbook modalities. Pre- and post-test scores were used to evaluate change in knowledge over ten modules. Twelve focus group discussions (FGD) were conducted to assess

participant attitudes towards course content and delivery. Descriptive statistics and t-tests were calculated. FGDs were coded inductively and deductively and analyzed for common themes.

Results:

A total of 32 participants took part in the pilot. Nine participants were from Free State, eight from KwaZulu-Natal and 15 from Mpumalanga province. Sixteen participants were nurses, ten were data capturers, three were community health workers (CHW) and three from other cadres. Most participants (n=23, 72%) completed all ten modules. Overall, participants' test-scores improved by 29.7 points on a 200-point scale. Participants felt that content was relevant and useful to their work, but some identified limited computer skills as a barrier to the e-learning modality. Participants preferred e-learning over workbooks.

Conclusion:

Overall, HIS knowledge significantly improved health worker knowledge in HIS. Participants felt that the content of the modules was relevant, applicable, and useful to their daily work. Our findings suggest that the HIMAE course may be an effective tool in contributing to a strong HIS in South Africa, bridging health care workers' knowledge gaps in understanding, producing and using quality data.

Abbreviations and Acronyms

ART	Antiretroviral therapy
CDC	Centers for Disease Control and Prevention
CHW	Community health worker
DHIS	District health information system
FETP	Field Epidemiology Training Program
FGD	Focus group discussion
HIMAE	Health information management and applied epidemiology
HIS	Health information system
HIV	Human immunodeficiency virus
I-TECH	International Training and Education Center for Health
KZN	KwaZulu-Natal
LMS	Learning management system
M&E	Monitoring and evaluation
NDOH	National Department of Health
NICD	National Institute for Communicable Diseases
RTC	Regional training center

Introduction:

Monitoring of antiretroviral therapy (ART) adherence, uptake of HIV prevention interventions, and progress towards achieving strategic goals requires accurate and reliable data.¹ Disease surveillance, health service statistics, and facility information are routinely used for policy-making, monitoring of programs, resource allocation, and evaluating program impact at the level of the community, the district, and higher levels nationally and internationally.² Health information systems (HIS) are used to collect, process and report on data for such uses; however, most countries lack a strong enough HIS to provide sufficiently reliable, accurate and timely data for these purposes.^{2,3} One key shortcoming of country HIS is a lack of human resources capacity, where front-line health care workers are asked to fill the role of health information officers, while lacking in the appropriate analytical skills.^{2,3}

In South Africa, the District Health Information System (DHIS) was introduced in 1996 to collect monthly facility-based data from primary health services and district hospitals in the public sector to promote the analysis and use of information for decision-making and management of facility health programs.^{4,5} Studies evaluating the DHIS have indicated that the quality of data collected is insufficient.^{4,6} There is a general lack of understanding of the relevance of data-collection, as well as a lack of use of this data for decision-making at the facility level.^{4,6} Others note a disconnect between training and job description, where nurses are often appointed the task of data collection within health facilities in South Africa despite limited training in numeracy and the importance of data collection.⁶ Data collection is therefore often not prioritized and is delayed.⁶ Although competence tended to be higher among managers, levels were low across all positions: competency of facility health workers in HIS tasks was only 30%,

and only 14% of respondents could demonstrate accurate interpretation of findings.⁶ There is a clear need to address this knowledge gap among health workers to strengthen the quality and use of routine health data in the public sector.¹

E-learning and other forms of self-paced learning are increasingly being used in low-resource settings to supplement health care worker education and to provide learning opportunities that may not be available due to instructor shortages.^{7,8,9} E-learning has also been offered to health care workers who do not have access to the formal medical education system,¹⁰ and to reduce the cost of education.¹¹ A systematic review found such programs to be either equivalent to, or in some cases, more effective than traditional learning.⁹

The University of Washington Training and Education Center for Health (I-TECH) created and evaluated a distance-based training program on Health Information Management and Applied Epidemiology (HIMAE) in conjunction with the U.S. Centers for Disease Control and Prevention (CDC), the South African National Department of Health (NDOH) and the University of Witwatersrand. The distance-based e-learning course was created to address gaps in accurate, timely and reliable data reporting in health facilities in South Africa. This course was designed at an introductory level, targeting front-line clinical and public health personnel to improve their skills in the use and management of health information and applied epidemiology. The course is intended to be integrated into the larger Field Epidemiology Training Program¹² in South Africa, offering multiple levels of training to develop public health skills and knowledge, in partnership with the National Institute for Communicable Diseases (NICD)¹³. The pilot implementation of the HIMAE course was evaluated to assess user attitudes towards course

delivery, effectiveness and usability of the course, and relevancy of course content to the South African public health context.

Methods:

Evaluation Design

The HIMAE course was evaluated through a mixed-methods (quantitative and qualitative) pre-post evaluation design to assess competencies including basic numeracy skills, data quality, quality improvement, and health information systems (module topics are described in Table 1). Focus group discussions (FGDs) were conducted to assess relevancy and usefulness of course content, as well as participant experience with course delivery and modality preference.

Individual feedback and module-review surveys were used to help inform content and structural changes to the course.

Population and Setting

The HIMAE course was offered to participants at regional training centers (RTCs). RTCs were created by the National Department of Health (NDOH) to coordinate health care worker trainings in all nine provinces of South Africa. Three RTCs participated in this pilot in Free State, KwaZulu Natal (KZN), and Mpumalanga provinces. Provincial health authorities in charge of the RTCs selected a total of 32 participants among the three provinces. Pilot provinces were chosen based on I-TECH's relationship with the RTCs in each province, the interest of RTCs in participating, and to include a diversity of geographic settings and differences in knowledge and skill levels among health care workers. Participants represented a variety of health cadres,

including: nursing professionals and students, administrative clerks, data capturers and analysts, monitoring and evaluation (M&E) officers, and community health workers (CHWs).

Ethical Considerations

Participants completed voluntary informed consent and it was explained to each participant that the data gathered was to remain confidential. FGD facilitators obtained verbal consent from each participant prior to starting. This pilot evaluation received a non-research determination from the University of Washington, and was classified as a program evaluation by the US Centers for Disease Control and Prevention (CDC).

Data Collection

Participant demographic information was collected using NDOH records and the Moodle-based learning management system (LMS) used by the RTCs. Demographic information included cadre, province, and facility type. Participants took the course as a paper-based workbook and via e-learning modules, switching modalities each day, over two one-week time periods. The course was designed such that participants were estimated to have a total of approximately 60 hours of contact time with the course. Participants completed pre-tests and post-tests of identical questions for each module to assess their baseline knowledge and learning growth.

FGDs were conducted at each RTC at the beginning and end of each week of the course. These discussions aimed to obtain feedback on the content, format, delivery and other aspects of the modules, as well as overall course experience. Focus group discussion guides were created to

facilitate discussions and ensure continuity across provinces. FGDs were recorded, transcribed, and translated into English as needed.

Individual participant feedback was collected to inform changes and improvements to the course. During each module, participants completed open-ended, module-specific review forms to note specific concerns or suggestions about the content or format of the material. After each module, participants additionally filled out questionnaires asking closed-ended questions about satisfaction, achievement of learning objectives and other topics. Participants also had the opportunity to provide feedback one-on-one to an I-TECH representative at any time throughout the course.

Data Analysis

Module-specific pre- and post-test scores were totaled across all 10 modules to create overall pre- and post-test scores for each participant out of 200 questions. Imputation was used to address missing pre- or post-test scores. The mean module-specific score for each pre- or post-test, taken across all participants with completed tests, was used as the imputed value for each missing test. This imputation method was used because scores varied considerably by module due to the different difficulty levels of each module. Each module had a total of 20 questions and 20 possible points except for module five, which had only 19 questions. The score for module five was adjusted to a 20-point scale by applying an inflation factor, so that every module had an equal weight.

Data collected from pre-and post-tests, FGDs, and module surveys were analyzed for this thesis. Quantitative analyses were performed using STATA version 13. Counts and proportions of participants by cadre and province, and by completion of modules were summarized. Descriptive statistics, including calculation of mean pre- and post-test scores, and 95% confidence intervals (CIs) were calculated. Mean test-scores were compared between participants who completed all 10 modules, those who had missing tests, and all participants combined, using imputed scores. Comparisons were made between pre- and post-test scores by cadre, province, modality (workbooks or e-learning) and module. Paired t-tests were used to test the null hypothesis of no difference between pre- and post-test scores.

Qualitative analyses were both inductive and deductive. An a priori thematic codebook was created and applied to transcripts. Coding of transcripts was iterative, and new codes were created as new themes emerged from the texts during the analysis. Memos were used to link FGD responses with information feedback and observations from the pilot. A second coder was used to ensure reliability of the analysis at the beginning stages of coding. Data was organized according to the themes that emerged and used to help inform changes to individual modules and the formatting and delivery of the course when relevant and feasible.

Results:

Participants Characteristics:

Table 2 presents the characteristics of participants and their completion of modules.

A total of 32 participants took part in this pilot, and included 16 nurses, ten data capturers, three community health workers (CHW), one data analyst, one monitoring and evaluation officer, and

one senior administrative clerk. Among the participants, eight were in Kwazulu-Natal (KZN), nine in Free State, and 15 in Mpumalanga province. Of the 32 participants, 23 (72%) completed all ten modules. Of the nine participants who did not complete all ten modules, six were missing only one pre- or post-test, two were missing three pre- or post-tests, and one was missing pre- and post-tests for four modules. Among the provinces, Free State had a high rate of incompleteness (55%). Among cadres, only CHWs had a 100% completion rate.

Overall Improvement in Knowledge

Mean test scores and change in score for participants are presented in Table 3, by province, cadre, and completion category. Incompleters (those who were missing one or more pre- or post-test) had a slightly lower mean total pre-score at 99.3 out of 200 (50%), as compared to 102.3 (51.1%) for all participants, and 103.5 (52.0%) for completers (participants who completed all ten modules). Incompleters also had a lower mean total post-test score at 120.1 (60.0%) as compared to 132 (66.0%) for all participants, and 136.5 (68.2%) for completers.

Among the cadres, CHWs had the lowest baseline mean total pre-score at 90 out of 200 (45.0%); however, their improvement in test scores was high (20.2%). Even though other cadres (data analyst, monitoring and evaluation officer, and senior administrative clerk) had the highest mean total pre-test score of 111.7 out of 200, they also demonstrated improvements in total test scores (21.0%). This compares to 11.0% for nurses, and 17.0% for data capturers.

There was a statistically significant improvement in total scores after the course, which improved on average by 29.6 points ($p < .001$, 95% CI:24.3-35). All provinces, cadres and completion

categories had an increase in mean total score; in all provinces, and all but two cadres, this change was significant. Free State participants improved, on average, by 25.1 points ($p=.001$, 95% CI:12.8-37.3), KZN participants by an average of 31.4 points ($p<.001$, 95% CI: 25.5-36.9), and Mpumalanga participants by an average of 31.3 points ($p<.001$, 95% CI: 22-40.8). Data capturers improved by an average of 35.0 points ($p<.001$, 95% CI:26.2-43.5), and nurses by an average of 22.0 points ($p<.001$, 95% CI:15.1-28.8). Completers improved by an average of 33.0 points ($p<.001$, 95% CI:27.4-38.6).

Mean pre- and post-test scores for each module are displayed in Figure 1. Test scores improved across all ten modules. Both pre- and post-test score means were lowest in module 4 (numeracy and data patterns) at 8.1 out of 20 points on the pre-test, and 10.9 points on the post-test.

Modules 3 and 7 (data for quality improvement and introduction to determinants of disease, research and study design) also had low baseline scores (8.8 and 9 out of 20 points), however, change in scores was high (5.3 and 4.7 points). Change in score was lowest in module 6 (frequency and distribution of disease) at 1.75 points.

Figure 2 displays improvement using the changes in mean scores between pre- and post-tests for each module by comparing modalities. In eight out of ten modules improvement was greater for participants using workbooks rather than e-learning; in five cases this difference in improvement was meaningful (at least 1 point difference).

Focus Group Discussions:

Analysis of the focus group discussions revealed five major thematic categories: relevancy, accessibility, course delivery, gains in knowledge and skills, and dissemination.

Relevancy

Overall, participants confirmed that the content presented in the modules was relevant to their work. They felt that the content reflected current challenges in the workplace, such as testing antenatal patients for HIV, gaps in tuberculosis registers, lost files in clinics, as well as targets and indicators. Participants felt that the narrators, content and skills presented in the course were also relevant to the South African context. Multiple participants across all three provinces mentioned that learning how to create and use graphs was very helpful, as this is something they are expected to do in their facilities but did not fully understand. Participants also felt that modules on statistics, and data management and analysis were useful and relevant to their work.

“For me it was the data management and the module with the stats...that I found more relevant to my line of work because at work I have to supervise the data capture and...we didn’t receive any formal training”

Only one module, “Introduction to Applied Epidemiology: Determinants of Disease, Research and Study Design” received negative feedback. Participants did not feel that this content was relevant to everyday nursing or clinical care and because they could not apply it to their work they found it confusing.

Accessibility

For the most part, participants reacted positively to the use of the computer and the LMS, though computer skill level varied. Many participants required assistance from course facilitators to create email addresses and set up accounts. Some participants felt that the LMS was well planned

and presented, and others felt that it would have been easier if they had had basic computer skills from the beginning. Some felt that it took them longer to complete the modules because they were not used to computers. Some even suggested that they be offered basic computer skills as part of the course. This distinction in skill level was expressed both between provinces and ages. For example, Mpumalanga participants expressed a willingness to use computers, despite a lack of experience with them.

Myself, I feel that it will be a bit difficult because I am not used to using a computer but I will try.

Using a computer is a very nice thing because it allows to understand things faster, it opens your mind and a computer is easier to use.

It is only maybe us the younger ones with these [computer] skills but we are not given the opportunity or we are not exposed to such facilities.

Free State participants mentioned age as a limitation in computer abilities:

There may be a challenge because unfortunately olders here are not basic computer literate...people of my age and even younger have not touched a computer.

KZN participants in contrast were confident in their computer skills.

I don't think it was difficult [to use the system] because we're all computer trained and are able to read through and click the right boxes so for me I think it was easier.

Some participants found the English to be challenging at times, and felt that some of the terms could be simplified or that a glossary or manual of terms could be provided with the course.

Course Delivery

Despite some limitations in computer skills, most participants across all provinces expressed a strong preference for completing the modules via e-learning rather than workbooks. Participants

liked the e-learning version better because it was easier to follow along and listen to the narrators. They felt that the e-learning version was more interactive and easier to focus on than the workbook. Participants felt that it was more difficult to concentrate using the workbooks.

I think when you are reading the manual if you're just sitting there trying to concentrate it seems as though the information is too much or there's information overload, unlike when you're using the audio.

Participants appreciated having the workbooks as a reference to follow-along with while listening to the audio, or to refer to once they went back to work.

A concern expressed was with the amount of information presented in the modules for the time allocated to the pilot. Participants felt that they were often rushing to get through the material to finish the modules each day over the two-week period. They expressed a desire for more time to finish, as opposed to less material in the same amount of time. Many participants felt that because they were tested at the end of each module and were pressed for time, that this placed more emphasis on reading the material to pass the test, instead of taking their time to read and understand the material. Many participants expressed this as “information overload” and felt the duration of the course should be longer.

Time is against us. You just do a read through with lack of understanding key points ending up guessing post-test answers. It's not easy to remember most of it.

I think the problem is the time factor trying to juggle reading and writing a test all at once. With time against you, you read with no understanding, chasing to finish on time.

Feedback commonly included a desire for more interaction in the course. This included a desire to work in peer groups, a desire to have a facilitator work through calculations with examples, or to have a facilitator to ask content-related questions.

Gains in Knowledge and Skills

By the end of both weeks 1 and 2 of the course, participants expressed gains in knowledge and skills relevant to their workplaces. Many participants expressed a better understanding of data and the need for quality data at all levels, from the facility to the national level. Participants better understood the patient pathway, and why data quality is important at all stages of this pathway. They also felt that this patient pathway helped them to understand the need for teamwork and the importance of everyone's roles at the facility:

Now we can really go back and enforce that teamwork starting from reception to say; this is not just registering patients or what but you're actually collecting data and this will result in the facility having data that is of quality. Starting from there up until the pharmacy which is like the end, so that pathway for me is something you can really take back to work and enforce.

Participants felt that they could identify gaps in data, identify discrepancies in data and explain to co-workers why data should be captured thoroughly and correctly. Several participants felt they were better able to use and understand Excel and data cleaning, as well as creating graphs with basic statistics. Participants felt that this course would be useful in understanding and meeting targets at their facilities. Many participants were enthusiastic about passing on their knowledge to co-workers, and held meetings after the first week to explain what they had been learning in this course.

What I have learnt that I will take back to my facility is the need not to rush through patients but to take your time and ensure that you have collected all the necessary data from the patient; if you omit important information then everything is messed up.

Dissemination Strategy

Course participants were very enthusiastic about the course and about including all levels of health care workers in the course. When asked who they would recommend this course to, participants suggested several different cadres including community health workers, data capturers, managers, nurses, and administration clerks. Participants stressed the importance of including every kind of health care worker because they all have a role to play in quality data.

When asked if it would be feasible to complete this course at their work places, participants largely agreed it would not be possible. Barriers included managers not allowing their staff to take time for training in facilities, too many distractions at work making it hard to focus, limited access to computers and internet, and work demands. Most participants felt that the RTC-based course was the best delivery method. However, participants in the KZN cohort felt that it would be possible to complete this kind of course at their facilities if all the technological equipment was available, suggesting iPads with internet bundles as an option.

Discussion:

This study evaluated a distance-based training course piloted in three South African provinces with 32 health care workers. Participants demonstrated significant gains in knowledge of health information management and applied epidemiology after taking this course. Participants also reported that the material was relevant and appropriate to the South African context and useful to their daily tasks at their facilities.

Results demonstrate improvements in test scores for the course overall, for each module, and in all three provinces and across all 4 cadres. Although education was not directly taken into

consideration in this pilot, results suggest that this course provides benefits across different levels of education. Community health workers (CHWs) are commonly defined as delivering health care services without formal or professional qualification in health sciences.¹⁰ The CHWs taking part in this course had a lower baseline score than other cadres, but still demonstrated high gains in knowledge, suggesting that the content of the course is understandable to a wide audience. Others have noted the importance of including all cadres of health care workers in similar e-learning initiatives to ensure that accurate information reaches everyone involved in combating HIV and associated conditions.¹⁰ This correlates with feedback from participants in FGDs during this pilot, who felt this course should be offered to all levels of health care workers to ensure data quality across the entire patient pathway.

Knowledge gains were evident through both workbook and e-learning modalities. However, participants expressed a strong preference for e-learning, stating that the narration was engaging and made concentration easier. Accessibility was expressed as a limitation to e-learning, given that levels of computer literacy and access to computers and internet, vary among participants and facilities. This may be especially challenging in low-resource settings such as rural areas of South Africa. This is consistent with findings in similar studies on e-learning initiatives which highlight the need to consider local available resources when implementing programs.^{10, 11} Also consistent with other studies, participants with limited prior experience using computers expressed willingness to learn and saw the value in adapting to new uses of technology,^{9, 11} Despite preference for the e-learning modules, workbooks were still recognized as a useful resource to refer to once participants returned to their facilities. Offering this course in both workbook and e-learning formats in the future, or providing hard copy materials as back-up to e-

learning, may address the need for flexible approaches to implementation aligned with available resources.

Participants felt that the lack of interaction with instructors or other students when taking this course was a limitation. This has also been cited as a challenge in other studies on the use of e-learning.^{7, 9, 10} Ultimately, the self-paced nature of the course requires motivation on the part of the health care worker, and incentives such as certificates have been considered as one approach to address this need. Participants also felt that the amount of information in the modules was too much for the two-week block of time allocated for the pilot. In contrast, however, participants did not feel that their workplaces would be an appropriate setting to complete this course given the demands of daily work. These factors should be considered in the dissemination strategy.

Conclusion:

This contributes to a body of literature indicating the value of e-learning initiatives for expansion of in-service education for health care workers globally.^{5, 7-11} Overall, participants felt that the content of the modules was relevant, applicable, and useful to their daily work. The wide-ranging accessibility and introductory level of course content position this course as an appropriate option for a “level 0” pre-requisite for the multi-level FETP in South Africa. Our findings suggest that the HIMAE course may be an effective tool in contributing to a strong DHIS in South Africa, bridging health care workers’ knowledge gaps in understanding, producing and using quality data.

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Tables and Figures:

Table 1: Course modules and sample learning objectives for the health information management and applied epidemiology course, South Africa (2017)

Module	Learning Objective
1. Importance of Data, Measurement, and Performance in Health	Define “data” and “information” and the differences between the two concepts
2. Basic Numeracy in Health Care: Counts, Frequencies and Categorical Variables	Demonstrate appropriate interpretation of two-way tables and charts.
3. Using Data for Quality Improvement	Describe the 5 foundation principles of managing CQI efforts.
4. Basic Numeracy in Health Care: Numeric Measures, Distributions, and Data Patterns	Explain and interpret histograms showing the distribution of numerical data
5. Health Information Systems and Data Management	Define validity, reliability, and other attributes of data quality
6. Introduction to Applied Epidemiology: Frequency and Distribution of Disease	Define, calculate and interpret measures of frequency: prevalence, cumulative incidence and incidence rate
7. Introduction to Applied Epidemiology: Determinants of Disease, Research and Study Design	Define bias and confounding in epidemiologic studies and describe the main categories of bias
8. Excel Basics for Summaries of Categorical and Numeric Data	Use Excel to apply basic maths function to quantitative data (sum, average, etc.)
9. Communicating and Disseminating the Results	Identifying various models and best practices for providing data feedback
10. Bringing it All Together	Integrate, analyze and apply knowledge learned in the previous 9 modules.

Table 2: Participant characteristics among those participating in the health information management and applied epidemiology course, South Africa (2017).

	Total N(%)	Complete N(%)	Incomplete N(%)
All Participants	32 (100%)	23 (72.0%)	9 (22.0%)
Province			
Free State	9(28.0%)	4(40.0%)	5(55.5%)
KZN	8(25.0%)	7(87.5%)	1(12.5%)
MP	15(47.0%)	12(80.0%)	3(20.0%)
Cadre			
Nurse	16(50.0%)	10(63.0%)	6(37.0%)
Data Capturer	10(31.2%)	8(80.0%)	2(20.0%)
CHW	3(9.4%)	3(100%)	0(0.0%)
Other	3(9.4%)	2(66.6%)	1(33.3%)

Table 3: Mean pre- and post-test scores, difference in scores, and t-test results by participant categories for the health information management and applied epidemiology course, South Africa (2017).

T-test Results	N	Mean Pre-test Score*	Mean Post-test Score*	Mean Change (% improvement)	95% CI for Change	p-value
Characteristic						
Free State	9	115.2	140.3	25.1 (12.4%)	12.8-37.3	0.001
KZN	8	111.2	142.6	31.4 (15.7%)	25.5-36.9	<.001
MP	15	90.0	121.2	31.3 (15.6%)	22.0-40.8	<.001
Nurse	16	106.2	128.2	22.0 (11.0%)	15.1-28.8	<.001
Data Capturer	10	97.3	132.1	35.0 (17.0%)	26.2-43.5	<.001
CHW	3	89.0	128.4	39.4 (20.2%)	9.1-70.0	0.03
Other	3	111.7	154.3	42.6 (21.0%)	0.4-82.4	0.05
Completers	23	103.5	136.5	33.0 (16.5%)	27.4-38.6	<.001
Incompleters*	9	99.3	120.1	21.0 (10.4%)	8.4-33.2	.005
Overall	32	102.3	132.0	29.7 (15.0%)	24.3-35	<.001

*Using imputed values

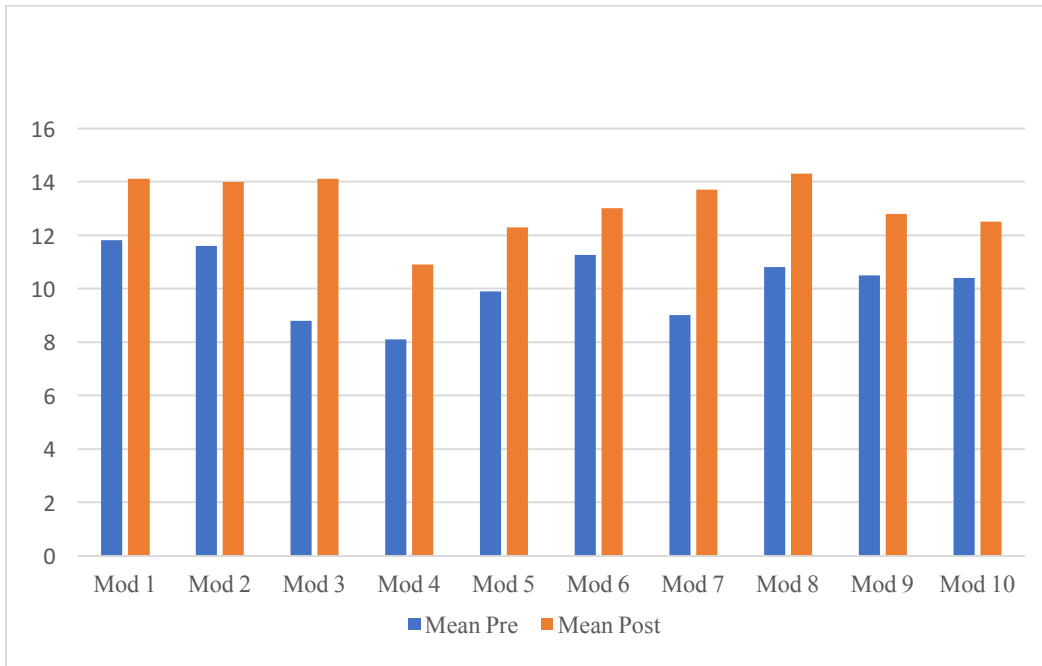


Figure 1: Mean pre- and post-test scores by module

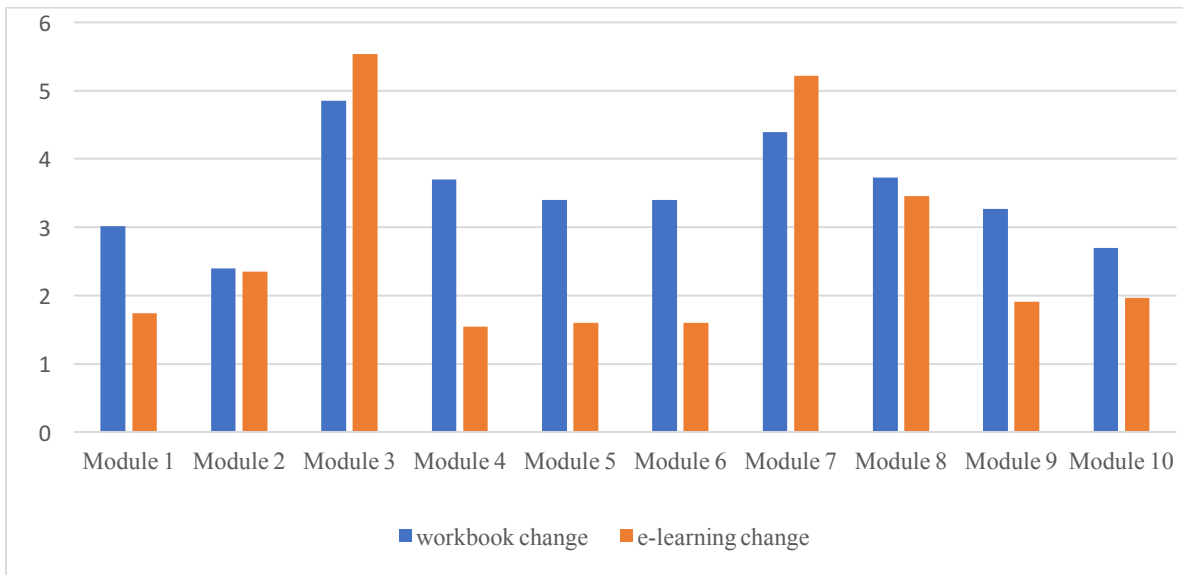


Figure 2: Change in scores for each module by modality

Appendix A – SkillsSMART Participant Data Collection Form

Personal Information	
Type of Participant (please tick): Facilitator <input type="checkbox"/> Participant <input type="checkbox"/>	
1. Name of training	
2. Today's date	
3. Title (Please tick one)	<input type="checkbox"/> Dr. <input type="checkbox"/> Mr. <input type="checkbox"/> Ms. <input type="checkbox"/> Prof.
4. First Name*	
5. Middle Name	
6. Last Name*	
7. Persal Number	
8. Gender* (Please tick one)	<input type="checkbox"/> Female <input type="checkbox"/> Male
9. Birth date	Day <input type="text"/> Month <input type="text"/> Year <input type="text"/>

Current Contact Information	
Place of Work	

10. Province*	
11. District*	
12. Sub District*	
13. Facility Name*	
14. Facility type (Please tick one)	<input type="checkbox"/> Academic (Medical/Nursing/Other College) <input type="checkbox"/> Community Health Centre (Feeder Clinic) <input type="checkbox"/> Hospital <input type="checkbox"/> Hospital – inpatient <input type="checkbox"/> Hospital – outpatient <input type="checkbox"/> NGO-supported (managed, financed) <input type="checkbox"/> Other (Please specify) _____ <input type="checkbox"/> Training Center

Address and Phone	
15. Home phone	
16. Work phone	
17. Mobile phone	
18. Email	
19. Fax	

Qualifications			
20. Professional qualification* (Please tick one)	<input type="checkbox"/> Community Health Worker <input type="checkbox"/> Dental Services <input type="checkbox"/> Laboratory <input type="checkbox"/> Mid-Level Clinician <input type="checkbox"/> Nurse	<input type="checkbox"/> Student <input type="checkbox"/> Paramedical <input type="checkbox"/> Pharmacy <input type="checkbox"/> Physician <input type="checkbox"/> Medical Student	<input type="checkbox"/> Social Services <input type="checkbox"/> Counselor <input type="checkbox"/> Social Worker <input type="checkbox"/> Other (Please specify) _____
21. Primary Responsibility (Please tick one)	<input type="checkbox"/> Administrator <input type="checkbox"/> Program Manager <input type="checkbox"/> Trainer	22. Secondary Responsibility (Please tick one)	<input type="checkbox"/> Administrator <input type="checkbox"/> Program Manager <input type="checkbox"/> Trainer

Appendix B: Module Review Sheet Example

**Module 1: Importance of Data, Measurement, and Performance in Public Health
Review Sheet**

Thank you participating in the pilot of this course. The purpose of this pilot is to find out whether the material is relevant and understandable and whether you have any suggestions for improvements. This course is divided into 10 modules. This review sheet covers the workbook and e-learning versions of Module 1: Importance of Data, Measurement, and Performance in Public Health.

As you go through Module 1 in the workbook or online, please use this form to give us feedback on the module. The module is divided into parts, and for some parts, we have listed out the topic areas in this form.

Your input is invaluable for improving this course for future participants. Thank you!

Date: _____

Location (Province): _____

Professional qualification* (Please tick one)	<input type="checkbox"/> Community Health Worker <input type="checkbox"/> Dental Services <input type="checkbox"/> Laboratory <input type="checkbox"/> Mid-Level Clinician <input type="checkbox"/> Nurse	<input type="checkbox"/> Student <input type="checkbox"/> Paramedical <input type="checkbox"/> Pharmacy <input type="checkbox"/> Physician <input type="checkbox"/> Medical Student	<input type="checkbox"/> Social Services <input type="checkbox"/> Counselor <input type="checkbox"/> Social Worker <input type="checkbox"/> Other (Please specify) _____ —
Facility type (Please tick one)	<input type="checkbox"/> Academic (Medical/Nursing/Other College) <input type="checkbox"/> Community Health Centre (Feeder Clinic) <input type="checkbox"/> Hospital	<input type="checkbox"/> Hospital – inpatient <input type="checkbox"/> Hospital – outpatient <input type="checkbox"/> NGO-supported (managed, financed) <input type="checkbox"/> Other (Please specify) _____ <input type="checkbox"/> Training Center	

Part 1: Introduction

Time started: _____

In the feedback boxes, please tell what (if anything) was confusing or unclear. If you have ideas for what we could change to make the concept clearer, please note your ideas.

Page number (workbook) or screen number (eLearning)	Feedback / suggestions

Time ended: _____

Appendix C: Pre-test and Post-test Examples

The following pre- and post-test covers module 2 and is intended for use on both the workbook and e-learning course formats. Similar pre- and post-tests with content customized to each learning module will be provided for each module. Pre-post tests for the remaining modules are not included here in order to limit the length of the appendices.

Module 2 Pre- and Post-Test

1. Which of the following is the best example of a count?
 - a. 40-45
 - b. The number of patients who test for HIV per day
 - c. The number of people who are bad drivers
 - d. The number of clients who wait too long in line at clinic

2. For a count to be meaningful, it must be:
 - a. General so that it can be applied to the whole population
 - b. A whole number, no decimals
 - c. Specific and defined so that others can understand and reproduce the same count
 - d. Easy to understand

3. When a table breaks down the data by one dimension or characteristic, we call it a:
 - a. One-way frequency table
 - b. Bar graph
 - c. Two-way frequency table
 - d. Histogram

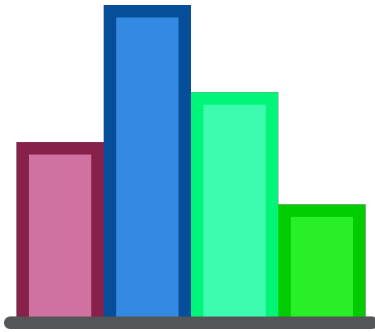
4. Which of the following types of charts shows information as pieces of the whole and shows patterns in the data?
 - a. A histogram
 - b. A one-way frequency table
 - c. A bar chart
 - d. A pie chart

5. This type of table shows data by adding up the frequency or count of patients by two different dimensions or characteristics.
 - a. A histogram
 - b. A one-way frequency table
 - c. A two-way frequency table
 - d. A bar chart

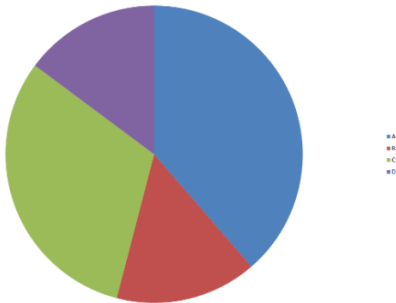
6. Draw a line from each graphic below in Column I with the corresponding title in Column 2.

Column I

Column II



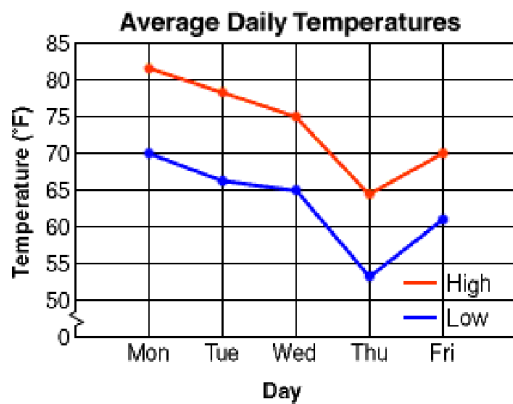
A. Pie chart



B. One-way frequency table

	Spanish	French	German	Total
Boys	10	2	8	20
Girls	15	12	3	30
Total	25	14	11	50

C. Line graph



D. Bar chart

7. A fraction is:
- Just another way to display data
 - A way to discuss information as part of a whole
 - One part of a two-way frequency graph
 - A type of data table

8. When displaying a fraction, the numerator represents _____ while the denominator represents _____.
- A part or portion of the whole; the total or whole
 - The population; a portion of the population
 - The total or whole; a part or portion of the whole
 - A whole number; the entire population
9. If we have 30 patients in the waiting room and 6 of them are seen before noon, what is the proportion of patients seen before noon? What would the decimal be for that?
- Proportion: $\frac{2}{15}$; Decimal: .20
 - Proportion: $\frac{3}{10}$; Decimal: .30
 - Proportion: $\frac{1}{5}$; Decimal: .50
 - Proportion: $\frac{1}{5}$; Decimal: .20
10. If you have the proportion $\frac{4}{5}$, what is the decimal? What is the percentage?
- Decimal: .40; Percentage: 40%
 - Decimal: .80; Percentage: 80%
 - Decimal: .45; Percentage: 45%
 - Decimal: .20; Percentage: 20%

Please answer the following questions using the following data from this description. In sister Zingy's clinic, 50 patients come in for HIV testing today. 35 are HIV-negative, and 15 are HIV-positive. Of those who are HIV-positive, 5 are eligible for ART.

11. What fraction of patients who tested for HIV at Zingy's clinic today are HIV-positive? Write this fraction as a proportion, a decimal, and as a percentage.
- Proportion: $\frac{15}{35}$; Decimal: .43; Percentage: 43%
 - Proportion: $\frac{3}{10}$; Decimal: .30; Percentage: 30%
 - Proportion: $\frac{7}{10}$; Decimal: .70; Percentage: 70%
 - Proportion: $\frac{35}{50}$; Decimal: .35; Percentage: 35%
12. What fraction of HIV-positive patients are eligible for ART? Write this fraction as a proportion, a decimal, and as a percentage.
- Proportion: $\frac{1}{3}$; Decimal: .33; Percentage: 33%
 - Proportion: $\frac{1}{10}$; Decimal: .10; Percentage: 10%
 - Proportion: $\frac{1}{7}$; Decimal: .14; Percentage: 14%
 - Proportion: $\frac{1}{5}$; Decimal: .20; Percentage: 20%
13. True or False? A proportion is another word which means the same thing as a fraction. **True**

14. The term _____ is used for something that we record that differs from person to person or differs for a person over time.
- Fraction
 - Count
 - Indicator
 - Variable**
15. The _____ of a variable tells us what values the variable takes and how often it takes these values.
- Distribution**
 - Proportion
 - Category
 - Indicator
16. Male or female; CD4 < 250 and CD4 > 250; and overweight, underweight, normal weight, or obese are all examples of:
- Indicators
 - Categorical variables**
 - Distribution of variables
 - Variability
17. Since data can change on a day to day basis, we call this:
- Variability**
 - Distribution
 - Irregular
 - Indicator
18. Fill in the sentences with the correct term (Click and drag the correct term to the empty box next to the sentence.)

Categorical data	An individual data point	Continuous data
------------------	--------------------------	-----------------

- Measures of central tendency are used with: **continuous data**
- Measures of frequency are used with: **categorical data**

19. Match each of the terms below to the corresponding example. (Click and drag the term in the coloured box to the empty box next to the question.)

Ratio	Count	Proportion
-------	-------	------------

- On a cruise ship, 10 of 200 passengers got influenza. **Proportion**
- On a cruise ship with 10 ill passengers, 4 were men and 6 were women. **Ratio**
- On a cruise ship, 10 passengers got influenza. **Count**

20. On a cruise ship, 10 passengers got influenza (4 men and 6 women) and 190 did not. What percent of the passengers on the cruise ship got influenza?

- a. 4%
- b. 5%
- c. 19%
- d. .5%

Appendix D – Focus Group Discussion Guide

HIMAE Course Pilot

Daily Focus Group Discussions with HIMAE Pilot Participants

FACILITATOR INSTRUCTIONS: Focus group discussions (FGDs) will be conducted daily at each participating Regional Training Centre (RTC) and will address the module or modules assigned that day. FGDs will include both participants who worked on the eLearning modules and those who did the Workbook modules. Participants will be asked to join regardless of whether or not they have completed the assigned module(s).

- Read the introductory text below, covering purpose, procedures and informed consent.
- Use the FGD questions to guide the discussion. Feel free to ask your own follow-up and probing questions to clarify points made by participants.
- Encourage all members of the group to participate in the discussion. This can be facilitated by phrases such as, “We haven’t heard from you yet - what do you think about this issue?”

[To be read aloud by facilitator to FGD participants]:

Background and Purpose

Before we get started, let me give some background on the purpose of this focus group discussion:

- In collaboration with the National Department of Health and CDC, I-TECH has developed a distance-based training course on health information management and use for health care workers. The course is available in two comparable formats: a paper-based workbook and eLearning. You have been asked to participate in the course pilot because you are among the target audience for the course. Your feedback will help us to improve the course.
- Please do not be shy about telling us your thoughts and opinions. We are interested in all types of feedback, even critical feedback. We appreciate in-depth, honest feedback from all of you as it will help us to understand how we can make the training more useful and relevant

Procedure

- The focus group discussion will take approximately 45 minutes.
- We will be audio recording this discussion [show participant the recorder]. The reason we are recording this is to make sure we do not miss anything that is said. main reason we are recording is because it will be difficult to write down everything that is spoken during our discussion today. Once the interview is over the tape will be transcribed verbatim and this text will be used for analysis. Do you have any objections to the tape recording? *[If participant objects, recording will not be done].*
- *[If there is a note-taker then the note taker must be introduced.]* _____ will also be taking notes – as we know technology can fail, and we want to be sure to capture your main messages to us. This will ensure that we consider your opinions as we try to improve the training materials and training strategies for the HIMAE course.

Voluntary Participation

- Your participation in the discussion is voluntary. You can choose which questions you do or do not want to answer, and you may leave the discussion at any time.

Questions

- Do you have questions so far about the FGD?

Informed Consent

- So do you agree to take part in this FGD? [Get verbal response from each participant.]

Questions

1. What did you like about the module you worked on today? What part or parts of the module were most interesting, engaging, or stimulating? What part or parts of the module were most relevant to your daily work and responsibilities?
 - a. For you?
 - b. For others?
2. What messages or content was missing from this module? What things would you have liked to learn more about, but which were not covered in the module?
3. What did you dislike about the module? What part or parts of the module were least helpful? Please describe in what way they were not helpful, e.g. boring, confusing, repetitive, not relevant to daily work and responsibilities, etc.?
 - c. For you?
 - d. For others?
4. What did you find most challenging or difficult about the module? Please explain what made this challenging or difficult.
5. Please describe any ways you will use the information from this module in your job.
6. Please describe your experience with the Learning Management System (LMS). Did you have any difficulties using the system to register and complete the pre- and post-tests? How easy or difficult to use was the system?
7. What do you wish had been different about the module? What should be changed before the course is rolled out for other health care workers in South Africa?
8. Would you recommend this module to colleagues? Why or why not?

Appendix E – Informed Consent Form

CONSENT TO RESEARCH

Evaluation of Health Information Management and Applied Epidemiology Course Pilot

RESEARCHERS

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RESEARCHER'S STATEMENT

I-TECH is working with the National Department of Health (NDOH) to develop a distance learning course to help public sector health workers gain the knowledge and skills needed to use health data to improve health programs and policies. This pilot evaluation study will assess knowledge gained by participants based upon completing the course, and will also collect feedback from participants, so that it can be improved in the future.

PURPOSE OF THE EVALUATION

We are interested in your feedback on the course and will use it to help make improvements. The purpose of the pilot evaluation is to improve the relevance and effectiveness of the course.

PROCEDURES OF THE EVALUATION

If you agree to take part in this study, you will be asked to take the course over two weeks. The course has 10 modules and takes about 60 hours to complete. As part of the pilot evaluation, we will ask you to take part in the following procedures:

- You will fill out a demographic questionnaire about your gender, age, place of work or residential address, job title, contact information, and professional qualifications. home language
- You will take a brief test before starting each module. You will then take the same test again after completing the module. Each test will take 20-30 minutes to complete.
- As you work through each module during the pilot evaluation, you will also be asked to answer some questions on the module and share suggestions for improvement via written questionnaires. Questionnaires may take 5-20 minutes to complete.
- After you finish each module, you will also be asked to complete a survey on the module. Surveys may take 5-10 minutes to complete.

- You will also be asked to take part in two focus group discussions with other health workers who are taking the course. A discussion leader will ask questions about your thoughts on the course, and each focus group will take approximately 30-60 minutes.
- You will also have the opportunity at the end of each day to share your opinions on the course material with an I-TECH representative who will take notes on your comments. This is an option for participants who feel more comfortable talking about feedback rather than writing it down on a questionnaire. This is optional and could take 5-20 minutes.

RISKS, STRESS, OR DISCOMFORT

If you choose to participate, there is a risk you may feel uncomfortable sharing your opinions and experiences, including any challenges you've faced at work.

ALTERNATIVES TO TAKING PART IN THIS EVALUATION

You do not have to take part in this pilot evaluation study. Your participation is voluntary. Choosing to take part or not take part in this study will not affect your job as a health care worker. If you choose not to take part, you can continue to carry out your professional duties and nothing will change.

BENEFITS OF THE STUDY

There is no direct benefit to you for participating in this pilot evaluation study. However, we will provide meals and tea and other drinks and small snacks while you are taking the course. If you travel for the course, we will provide a small stipend to cover any meals outside of course hours. If you earn a passing post-test score for all modules you will receive a certificate of completion. Your participation is likely to help us learn how to improve the course for other health care workers who complete the course in the future.

SOURCE OF FUNDING

The pilot evaluation team and the University of Washington is receiving financial support for this study from the U.S .Centers for Disease Control and Prevention.

CONFIDENTIALITY OF INFORMATION

The evaluation team will protect the confidentiality of the information you provide during the pilot evaluation study. The information you provide during the pilot evaluation will not be linked to your name. We will also collect demographic data - for example, gender, facility type, professional qualification, etc. – using available tools to better understand your learning needs and interests. This information will also not be linked to your name.

You must be aware that your responses during a focus group will be shared with all other participants in the group. While we will encourage all group participants to keep the statements made during the focus group confidential, we cannot guarantee that other focus group participants will keep your responses confidential.

Following each focus group or interview, the research team will keep all information about you and your responses private. No personal names or health facility names will be used within the reports we produce as a result of this pilot evaluation study. The leadership and program managers will receive a written summary of the results. If possible, the research team will meet with you and your clinic staff to discuss the results. Following the meetings, we will publish the results so that other interested people may learn from the research.

Government and university staff sometimes review studies such as this one to make sure they are being done safely and legally. If a review of this study takes place, your records may be examined. The reviewers will protect your privacy. The study records will not be used to put you at legal risk of harm.

OTHER INFORMATION

If you don't want to be in the study, you do not have to participate. Being in this study is up to you; you will not be penalized if you don't want to participate or even if you change your mind later and want to stop.

You can ask any questions about the study. If you have a question later you can contact or call Mr. Evasen Naidoo at enaidoo@itech-southafrica.org and 012 433 0118, Dr. Nancy Puttkammer at nputt@uw.edu and +001 206 616 5139, and Dr. Richard Cooke at richard.cooke@wits.ac.za and 011 717 2021.

Signing your name at the bottom means that you agree to be in this study. You will be given a copy of this form after you have signed it.

Researcher's signature

Date

Your statement:

This research has been explained to me. I agree to take part in this study. I have had a chance to ask questions. If I have more questions, I can ask the researchers.

Your signature

Date

Appendix F – Module Content Description

Distance-Based Health Information Management and Applied Epidemiology Course for Health Care Workers in South Africa

Bringing Change by Measuring Impact

Course Description

This distance learning course will be available in paper-based workbook format as well as eLearning format. The course will be comprised of 9 learning modules, with a certificate of completion available for each module as well as for the overall course. The modules will include multiple parts, each of which can each be completed in 30-60 minutes, for a total completion time per module of 5-6 hours. The segments will contain interactive and practical learning exercises, realistic vignettes, case studies, and quizzes for self-assessment. Each module will have a pre- and post-test. Overall contact time is estimated to be 45-60 hours and learners will be encouraged to complete one module per week.

Intro Module

- Expectations
- Learning objectives
- Suggestions for learning:
 - Timeline for completion
 - Formation of peer networks (in person or virtual)
 - How to get credit for completion

Module 1: Importance of Data, Measurement, and Performance in Public Health

Learning goal: Increase motivation and insight into the importance of good data collection, quality, processing and feedback to health care quality and outcomes.

Learning objectives

2. Recognize the importance of strong data and information to guide health services and programs and of front-line health workers in contributing to data systems.
3. Define “data” and “information” and the differences between the two concepts.
4. Describe the purposes for using data in public health practice, with reference to the South African Community Oriented Primary Care model (COPC) and other models of public health practice.
5. Explain the patient care pathway and data cycle.
6. Explain the role of facility-level health care workers in the data cycle and the M&E of health programs.
7. Describe the distinction between monitoring and evaluating health programs.
8. Define what indicators are, why and how they are used, and how they are selected for use in monitoring and evaluating health programs (M&E).

9. Describe how data can be used in making decisions about patient care and about health programs.
10. Discuss consequences related to poor use of data and information in addressing a health problem.
11. Identify examples of best practices and missed opportunities in using data to improve patient and population health.
12. Define applied epidemiology, and why its tools are helpful to improving health services, programs, and systems.

Module 2: Basic Numeracy in Health Care: Counts, Frequencies and Categorical Variables

Learning goal: Increase numeracy and basic skills to work with data.

Learning objectives

1. Demonstrate correct use of counts and frequencies in describing and reporting upon health care services.
2. Demonstrate skills in addition, subtraction, multiplication, and division of counts, as applied to common scenarios in health services delivery.
3. Calculate and interpret fractions, proportions, and percentages in the context of health and healthcare.
4. Demonstrate appropriate interpretation of one way frequency data summaries which use different presentation formats (data tables, bar charts, pie charts, scatter plots).
5. Demonstrate appropriate interpretation of two-way frequency tables and charts.
6. Demonstrate ability to calculate conditional proportions (indicators *among* a particular sub-group).
7. Define the appropriate definition numerators and denominators for commonly-used health indicators and estimates of health program coverage.
8. Evaluate the plausibility of indicator values based upon correct definitions of numerators and denominators.
9. Define the term categorical variables.
10. Describe the concept of variability of data and its relevance in presenting summaries of health data, using categorical variables.

Module 3: Using Data for Quality Improvement

Learning goal: Increase knowledge of current South African data collection and reporting systems, indicators, and targets and how to use data to make improvements in services

Learning objectives

1. Define quality, quality improvement (QI), and continuous quality improvement (CQI) with reference to the South African NDOH Guide to Quality Improvement, the Ideal Clinic Initiative, and the 90-90-90 guidance.
2. Describe the 5 key principles of managing CQI efforts.
3. Define the 4 elements of a “Plan Do Study Act” cycle and how PDSA can be used as part of CQI.

4. Demonstrate how common data sources in South Africa can be used in planning and studying PDSA cycles.
5. Demonstrate how CQI indicators can be used for measuring small tests of change (STOC) using a PDSA approach.
6. Explain using at least 2 examples how CQI indicators are related to clinical care improvement.
7. Demonstrate how to measure CQI Indicators, display data, evaluate trends, and interpret results using typical South African data sources.
8. Describe the composition, roles and responsibilities of a facility-based CQI team.
9. Demonstrate the ability to identify gaps in the 90-90-90 indicators and to identify quality improvement strategies to address these gaps.

Module 4: Basic Numeracy in Health Care: Numeric Measures, Distributions, and Data Patterns

Learning goal: Increase skills to work with numeric data and to summarize average or central tendency of data on health.

Learning objectives

1. Demonstrate appropriate interpretation of continuous numeric measures commonly used in health (e.g. weight, CD4), including selection of the appropriate unit of measure and ability to convert common measurements in health between different units of measure and level of precision (decimal places).
2. Define and distinguish between numeric and categorical data.
3. Explain and interpret data summaries for numeric data, using grouped data in frequency tables.
4. Explain and interpret histograms showing the distribution of numeric data.
5. List and describe the standard measures location (mean, median, mode), spread (range), and shape (skewness).
6. Define the concept of outliers and the possible meaning of outlier values.
7. Describe the concepts of normal distribution, standard deviation, and z-score and apply these concepts to measurement of child weight.
8. Calculate summaries of location and spread to create data summaries using real-world numeric health data.
9. Use tables and graphs to show distribution and central tendency of numeric data.
10. Describe the concept of variability of data and its relevance in presenting summaries of health data, using categorical variables.

Module 5: Reinforcing Data Systems

Learning goal: Increase awareness of data systems and role of facility personnel in reinforcing data quality and using the systems toward their intended purpose.

Learning objectives

1. Describe methods used for collecting data within specific key national health programmes.
2. Discuss challenges that can occur in data collection for programmes.

3. Describe the benefits of data triangulation.
4. List procedures and practices for data management to assure security and confidentiality of health data.
5. Define validity, reliability, and other attributes of data quality.
6. Explain the importance of data quality and implications of poor data quality, in the context of at least 2 health programs.
7. Demonstrate ability to detect and diagnose suspicious or invalid indicator data.
8. Give examples of data entry and data management techniques that minimize errors.
9. Outline quality control measures that can improve data quality.
10. Explain how to conduct routine and in-depth data quality audits within your health facility.
11. Demonstrate planning action steps/recommendations for DQ improvement.
12. Describe how the TIER.net system and other standardized data collection, management and reporting tools are used at the facility-level officers to manage and report facility-level data.
13. Describe the steps used to generate, validate, and submit reports.
14. Demonstrate how to interpret required reports, and use reportable information to guide facility-level decision making.

Module 6: Introduction to Applied Epidemiology: Frequency and Distribution of Disease

Learning goal: To build knowledge of concepts in applied epidemiology, enabling engagement in detection and prevention of disease outbreaks, reporting of notifiable diseases, monitoring of coverage and utilization of health services, description and explanation of patterns of disease. The intent of the module is to develop increased interest and skills among learners in formal study of the frequency and distribution of disease in the communities they serve.

Learning objectives

1. Define rate, prevalence, and incidence.
2. Describe the methods for quantifying the existence and occurrence of disease in a population (steps to measure prevalence and incidence).
3. Explain how the concepts of person, place and time are used in epidemiology to describe the distribution of disease in a population.
4. Summarize the principles for comparing disease risk between two groups and inferring causal relationships from epidemiologic data, using an example of a disease that is distributed unevenly in a population.
5. Describe the purpose of outbreak investigation, terminology used in outbreak investigation, and steps in carrying out outbreak investigation.
6. Demonstrate development and use of line lists and epidemic curves in outbreak investigation.
7. Evaluate routine data for evidence of trend and detection of outbreaks.
8. Define the various measures of test performance (sensitivity, specificity, positive predictive value, negative predictive value), and interpret their implications for testing algorithms (e.g. confirmatory testing).
9. Explain principles of active and passive disease surveillance and South Africa's system for surveillance of notifiable conditions.

Module 7: Introduction to Applied Epidemiology: Determinants of Disease, Research and Study Design

Learning goal: To build knowledge of concepts in applied epidemiology, enabling engagement in studies of the determinants of disease. The intent of the module is to develop increased interest and skills among learners in explanatory study of factors which contribute to disease and disease prevention in the communities they serve.

Learning objectives

1. List the criteria that epidemiologists use to assess the likelihood of a causal exposure-disease relationship.
2. Explain the concepts of hypothesis testing, estimate, 95% confidence interval and p-value.
3. Define bias and confounding in epidemiologic studies and describe the main categories of bias.
4. Describe the characteristics of different types of studies: qualitative versus quantitative; observational studies (including descriptive and analytical studies) versus experimental studies; prospective versus retrospective studies.
5. Describe the characteristics, strengths and weaknesses of different types of analytical studies (cross-sectional studies, case-control studies and cohort studies) and randomized controlled trials.
6. Define the purpose of sampling in research and evaluation in health and identify different sampling techniques.
7. Describe different quantitative data collecting techniques, their advantages and disadvantages.
8. Identify principles for the ethical conduct of research studies and for the protection of human subjects.

Module 8: Excel Basics for Summaries of Categorical and Numeric Data

Learning goal: Apply knowledge and skills from prior modules to evaluate data, conduct analysis, interpret results, and draw and present conclusions and recommendations for improvements in health care and public health services.

Learning objectives

1. Demonstrate how to enter, save, delete, copy, paste, sort and filter data in an Excel spreadsheet.
2. Use Excel to apply basic maths functions to quantitative data (sum, average, etc.)
3. Use Excel to prepare one-way and two-way frequency tables.
4. Use Excel to prepare bar charts, pie charts and other visual data summaries.

Module 9: Translating Learning into Practice

Learning goal: Apply knowledge and skills from prior modules to evaluate data, conduct analysis, interpret results, and draw and present conclusions and recommendations for improvements in health care and public health services.

Learning objectives

1. Link decisions (including decisions on questions of resource-allocation) with potential data sources using a framework for linking data to action.
2. Describe different ways to effectively summarize data for specific purposes, and choose the most appropriate table or graph for each purpose.
3. Interpret and explain the programmatic relevance of different types of data and information.

4. Explain the importance of information feedback in program improvement and management.
5. Identify ten techniques for giving a strong presentation.
6. Identify five techniques for using PowerPoint effectively.
7. List guidelines for using PowerPoint for presenting graphs and data
8. Explain techniques to strengthen the data cycle and maximize data use.