**African Centre for Project Management,**

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**Course: Post Graduate Diploma in Public Health**

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1. *Give the definition of public health and trace its history*

In 1920 Charles-Edward A. Winslow defined public health as "the science and art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health.

According to WHO, Public Health is defined as “the art and science of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals (Acheson, 1988; WHO).

The definition by Charles Edward A. Winslow only looks at physical health and has left out mental health. This however does not make this definition invalid with the fact that health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1948). Public health therefor, in this regard takes into account both physical, mental and social wellbeing and merely not the absence of disease and infirmity of the public or community.

The WHO definition of Public Health is currently the one widely used, and it is “the art and science of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private communities and individuals”. This means that Public health requires the integrated efforts of both the private and public in order to achieve its goal of disease prevention, prolonging life, health protection and promotion.

According to the definition of Public health, it means Public health has been dated far back in the years when people started practicing Public health though by then they never understood what they were doing was public health. Public health has been practiced even before the proper definition of public health was determined and identified.

The historical development of public health, which began in ancient times, emphasizes how various public health concepts have evolved.

The following are the examples of the history and development of public health;

Early in the years, explanations for the occurrence of disease focused on superstition, myths, and religion. As the people were hunters and gatherers in the past, there came time when agriculture developed as they domesticated animals which gave them food and unfortunately also diseases especially the zoonotic ones. Garbage and wastes accumulated attracting rodents closer to them a main cause of the bubonic plague which broke out in the early years of 1347-1700s.

**The Hippocratic Corpus**

The Hippocratic Corpus was an early attempt to think about diseases, not as punishment from the gods, but as an imbalance of man with the environment. This was a good step relating it to the current understanding of public health that disease is associated by environment and the environmental factors are responsible for diseases such as the bubonic plague that swept Europe in the early years.

***Mode of Disease transmission/causation***

During the outbreak of the bubonic plague, several theories were used to explain the spread of the disease one of the principles of public health of identifying health outcome. The most popular explanation was that it was caused by "miasmas," invisible vapors that emanated from swamps or cesspools and floated around in the air, where they could be inhaled. Others thought it was spread by person to person contact, or perhaps by too much sun exposure, or by intentional poisoning.

***Disease prevention through wearing protective gears***

During the outbreak, the traditional doctors or the herbs men responsible in offering the treatment to persons affected by the diseases used herbs and wore protectives including gloves and face shields and masks which were packed with herbs aimed at neutralizing the miasma. This wearing of protectives is a preventive measure supporting the cause of disease from one person infected to another indeed a reasonable means through which infectious diseases are spread.

***Disease prevention through isolation and quarantine***

Quarantine and isolation as a method of prevention of disease from spreading dates to the 14th century when the black death swept the Europe. The Black Death was an epidemic of bubonic plague, a disease caused by the bacterium Yersinia pestis that circulates among wild rodents where they live in great numbers and density ( [Ole Benedictow](https://www.historytoday.com/author/ole-j-benedictow) **1996). This led to the practice of quarantine and isolation as it was believed to be transmitted from one person to another.** Travelers and merchandise that had potentially been exposed to disease were isolated for a period of time to ensure that they weren't infected. Some cities and towns would create a "cordon sanitaire,' a physical barrier that could only be crossed with permission. This is an effective way of preventing spread of the infectious diseases even currently as seen with Ebola patients in the current Ebola Outbreak in the DRC (MSF, September 23, 2019) and in Cholera treatment centers (UNICEF, 22 August 2017).

John Pringle published "*Observations on the Diseases of the Army*" in 1752, in which he proposed several measures aimed at improving the health of soldiers including improvements in hospital ventilation and camp sanitation, proper drainage, adequate latrines, and the avoidance of marshes. He wrote expensively on the importance of hygiene to prevent typhus or "jail fever," which was a common illness among soldiers and prisoners in jails.

**The Germ theory of disease**

Before Louis Pasteur and Robert Koch, Girolamo Fracastoro (1546) an Italian poet, astronomer and a geologist wrote about disease seeds carried by wind or direct contact. In 1546 Fracastoro published the paper "De Contagione", which deserves similar recognition. In the book, Fracastoro pronounced the modern doctrine of the specific character of fevers, the differentiation of typhus fever as a clinical entity and proposed that the infection resulted from tiny particles or "spores" that could be spread by direct or indirect contact, through infected objects or even without contact by long distance air dispersion. "De Contagione" made Fracastoro a pioneer of epidemiology and his theory remained highly influential for nearly three centuries, before being displaced by the germ theory (Fracastoro G, Wright WC, 1930).

**Epidemiology**

In 1662 John Graunt, a founding member of the Royal Society of London, summarized the data from "Bills of Mortality", a record of deaths that were recorded by parish clerks in London in a publication entitled "Natural and Political Observations Mentioned in a Following Index, and Made Upon the Bills of Mortality (John Graunt, 1899) and he came up with observations regarding common causes of death, higher death rates in men as compared to women, seasonal variation in death rates, and the fact that some diseases had relatively constant death rates, while others varied considerably. This means that Epidemiology as part of Public Health has been practiced long since 1662 and is currently being used. He also compared mortality rates to associate it with environmental and biological factors as well as socioeconomical factors as determinants of health.

In 1754 James Lind conducted what may be the world's first controlled clinical trial on 12 sailors with scurvy and by giving them different treatments, he found out that the citrus or the fruits he gave resulted in the cure of those sailors. This is because during long journeys, fruits available may go bad being perishable fruits or unavailability of them caused the scurvy.

John Snow a physician in London spent several decades studying cholera in a systematic way. He is most often credited with solving an outbreak of cholera that occurred in London in 1854. He examined victims and found that their initial symptoms were always related to the gastrointestinal tract where he reasoned of it as transmitted through water or food and this led to the current knowledge that cholera is transmitted through eating or drinking contaminated food with the cholera bacteria which is always shed through fecal matter.

**Water, Hygiene and Sanitation (The Sanitary Idea)**

In the early 1800s, Jeremy Bentham and his disciples (the theoretical radicals) developed the philosophy of utilitarianism which provided a theoretic underpinning for health policy and wider social policies.

Another point of sanitary idea was seen when Ignaz Semmelweis decided to require all attendants to wash their hands in chlorinated lime water before attending to a birth in the maternity department, and the rate of infection dropped.

Ignaz Semmelweis was a Hungarian physician who practiced in the maternity department of the Vienna General Hospital in the 1840s. Postpartum sepsis (puerperal fever) was a common occurrence and was almost invariably fatal. There were two maternity wards in the hospital, one where births were attended by medical students, and another where births were attended by midwives. The students often came directly from the dissecting rooms where they had been working with corpses with their bare hands. Puerperal fever was much more common in the ward tended by the medical students, but no one knew why.

He decided to require all attendants to wash their hands in chlorinated lime water before attending to a birth, and the rate of infection dropped which has till now existed as personal hygiene and other sanitary measures taken to prevent cross infection.

In 1842 Sir Edwin Chadwick, a social reformer, published a report entitled the 'Report into the Sanitary Conditions of the Laboring Population of Great Britain' proving that life expectancy was much lower in towns than in the countryside where he concluded that what was really needed was not more physicians, but civil engineers to provide drainage of streets and to devise more efficient ways of delivering clean water and removing sewage and other noxious substances. This means that it is important to provide safe drinking water and have a better and safe way of waste disposal for a better healthy population leading to the current Water, hygiene and Sanitation programs that are practiced by Public Health professionals at all levels to ensure the health of the populations.

Therefore, in general, Public health and its practice started long before it got to be known as the current Public health that is concern with the prevention of diseases, promotion of health and protection of health. Public health was practiced in the disciplines of identification diseases causation, prevention of diseases, hygiene and sanitation including personal and food hygiene including water, treatment of diseases including infectious diseases also being one way of prevention of diseases, diseases distribution among the population and factors responsible for diseases causation and transmission including risk factors. The epidemiology we are practicing now was practiced since and we conclude by saying that Public Health dates to the 14th Century before it was properly defined by WHO in 1948.

1. *How has technology improved communication of Public Health communication*

[Karehka Ramey](https://www.useoftechnology.com/author/usetekadmin/) (2013) defined Technology as a body of knowledge devoted to creating tools, processing actions and the extracting of materials to be used in the accomplishment of various tasks in daily lives. Technology is dynamic and it keeps on improving/changing because the needs and demands for technology keep on changing.

The definition of technology is science or knowledge put into practical use to solve problems or invent useful tools.

According to Merriam Webster dictionary, technology is defined as a manner of accomplishing a task especially using technical processes, methods, or knowledge.

Technology is applied and used in almost everything we do in our daily lives including at our work places to make work easier such as computers, communication, Transportation, learning, manufacturing, storage and securing and processing data as well as scaling up data.

Technology is human knowledge used and which involves tools, materials, and systems to make work easy and where its application typically results in the achievement of the desired goal and products.

If technology is well applied, it benefits humans, but the opposite is true, if used for malicious reasons.

Technology has brought a number of remarkable changes to the health industry throughout its evolution and has helped improve public health communication in many ways including;

**Easy access to medical information**

With the help of internet, medical information such as symptoms and preventive measures of diseases have been easily accessed by clients. Patients google on their signs and symptoms to get information about what they are suffering from in absence of their medical providers. This helps in giving information regarding the searched symptoms which saves time from meeting a doctor for consultations. People always get information about frequently asked questions keeping them away from seeing their medical providers such as doctors and nurses.

**Larger forums on social media**

With the social media taking full swing, public health information such as health education and other specific information about a health product can be shared with a wider range of clients or participants using social media such as WhatsApp groups and Facebook. Messages and information shared on social media are accessed by many viewers and hence, easy access to the information by many clients within a short time by just a click in their computers and smart phones or tablets.

Public health practitioners or medical doctors can offer advice or information specific to their practice, educating followers far and wide across the globe and in such groups, past patients who have been attended to by same professional or at a facility are able to leave feedback that will act as testimony of services they received at the specific medical facility, or with a specific doctor which can greatly help potential patients to narrow down a doctor or facility search that they feel could best serve their needs. When referred by a colleague or someone you share things in common such as peers or a diabetic patient referred to a specialist by another diabetic patient who has a testimony of the best service experienced you will not waste time looking for where to go but rather follow straight and go to where the services have been said to be better.

**Social support**

As mentioned above in the large forums as a result of social media, patients and clients also get social support one of the most powerful medication needed in disease treatment and mental ill health. As people form social groupings, messages of encouragement and uplifting messages are easily passed to the rightful recipients. This social support offer a better psychological and psychosocial treatment to many in that group.

**Quick Turnover rate**

Technology has improved the communication between health service department where results such as Laboratory results can be out in a matter of minutes or hours as compared to the olden way where some tests take days if not weeks. Technology used in the diagnosis of diseases has made communication between the departments faster due to shorter turnover rate of results leading to better services.

**Improved relationship with patients**

Improvement in technology such as personal health records has led to improvement in relationship between healthcare providers and the patients. This is because, the provider can access past history of the patient and as he talks to the patient about it the patient feels loved and cared improving the relationship between the provider and the client. Improved relationship builds trust and leads to better health outcomes. By the health service provider looking through the history and relating to the present, it is easier to pass on a message of encouragement during health education easy information flow. For example, when a patient diagnosed with high cholesterol has been encouraged to change eating habits and do exercise to manage the cholesterol, by looking to the trend and talking about the changes in the cholesterol levels it will encourage the client to continue with the life style changes he or she has adapted that is seen to improve he/her health.

**Prediction of outbreaks/ Epidemics**

With the use of the electronic health records and the internet being used for searching answers to problems faced by individuals such as signs and symptoms of diseases is growing, it becomes easier for public health professionals to predict an outbreak as the searches are piled up in the internet to give the possibility of an outbreak looking at the number of people searching for an answer to a specific disease or symptom at a particular location. This allows ahead of time identification of such outbreaks hence earlier dissemination of messages about the suspected outbreak.

**Linkage of remote patients to healthcare professionals**

Information and communication technology improved the lives of many by linking remotely located clients to specialists who may be far away from these clients through the use of telemedicine. As the number of specialist is usually not enough to serve the entire population, the use of technology has made it easier to communicate and link patients to specialist through the use of telemedicine where the specialist does the provision of services online and the client gets the services, he/she requires. This has improved on the communication in public health greatly improving healthcare access in rural areas.

**Digitalization of health records**

The digitalization of health records has made work easier and simpler in healthcare delivery. For example, the Electronic health records has eliminated the erroneous method of keeping manually entered data that is usually kept in hard copies. This means that patients and healthcare service providers can access health information with easy. This digitalized health records minimizes communication gaps between different treating doctors as the data is kept in the digital system without errors (Albert Tuman, 25 September 2019).

**Health messaging by use of SMS**

With the development in technology and with the current population of people with phones increasing, it has become easier for health promotion and protection messages to be sent out to the public by mobile telephones. This allows the messages to be sent out to so many people within the shortest time. According to the Pew Research center, 96% of Americans own a cellphone of some kind and 81% of these own a smart phone (Pew Research Center, 12 June 2019). This means when a health message is to be sent out via Short message sending (SMS), at least 96% of the Americans will receive the message. While the 81% who have smart phones have access to mobile apps that are good in the provision of information as well as used in the screening of some diseases such as cholesterol, glucose as well as blood pressure measuring apps. These are apps that help in the communication of health messages and information.

Also, with the availability of mobile telephones in villages or remote areas, it has been able for the community to call for medical help during difficult time of need through the use of a telephone (WHO, 2012) which delivers messages instantly. For example, people in remote places have been able to call for ambulances to pick and transport pregnant women during labor pains preventing maternal and infant mortalities.

**Readily available data for research**

Technology has made data and information available for research. Instead of public health professionals going to collect data from people going from place to place, technology has made the information and data readily available for researchers to obtain from the digitalized health records and the internet. This makes it easier for researchers to come up with their findings and recommendations for what they researched on that can in turn be accessed easily by the population.

Therefore, in conclusion, technology has improved the public health communication. Technology such as the internet gives patients easy access to information, allows clinicians to easily update information for easy and wider access and it offers flexibility to create interactive formats for improved patient understanding such as with the social media. It further improves relationship between the patients and the healthcare providers, and it makes them to have an informed choice in the use of health services appropriately while improving confidence in the care they receive from the providers. Technology has not only improved public health communication but further improved it to the extent that it has relieved the stress healthcare providers go through in the past when the technology had not improved.

1. *Using an example of a communication campaign in your organization, explain how it was done and explain how effective or infective it was.*

Communication is the process of sending and receiving messages through verbal or nonverbal means, including speech, or oral communication; writing and graphical representations (such as infographics, maps, and charts); and signs, signals, and behavior. More simply, communication is said to be "the creation and exchange of meaning (Nordquist R., September 19, 2019)

While media critic and theorist James Carey defined communication as "a symbolic process whereby reality is produced, maintained, repaired and transformed" in his 1992 book "Communication as Culture," positing that we define our reality via sharing our experience with others.

Communication is therefore, the imparting or exchange of information by writing, speaking or using other medium of communication from one place, person or group to another. The ways of communication are either verbal, nonverbal, written or visualization communications. In communication, an information or message is passed from one person or group called the sender through a medium or a channel to the intended receiver who receives the message and interprets the message as intended by the sender and the receiver gives a feedback either through the same channel or another.

In any communication, there is a sender and a receiver, a message, and interpretations of meaning on both ends. The receiver gives feedback to the sender of the message, both during the message's conveyance and afterward.

A campaign is defined as, a work in an organized and active way toward a goal, typically a political or social one or it can as well be defined as, a plan consisting of several activities directed toward the achievement of an aim or objective according to the American dictionary. In a communication campaign message is passed to a group of people and in this case the population or the community in order to achieve a desired goal or objective. This means that the target of the communication is a group of people where a mass media is best suited for.

In the case of South Sudan, the types of mass media most commonly used are the Television, the radio, Bill boards, public announcement such as in big gatherings like markets, churches and funeral places and print media.

**Television campaign of the deadly Ebola prevention**

The role of mass media campaign or communication campaign is to provide information and remind the population of effects of health damaging behavior such as poor personal hygiene, shifting attitudes and prompt behavior change.

The Democratic Republic of Congo (DRC) declared their tenth outbreak of Ebola in 40 years on 1 August 2018. The outbreak is centered in the northeast of the country, in North Kivu and Ituri provinces. With the number of cases having surpassed 3,000, it is now by far the country's largest-ever Ebola outbreak. It is also the second-biggest Ebola epidemic ever recorded, behind the West Africa outbreak of 2014-2016 (MSF, September 2019).

With the outbreak of Ebola in the neighboring Democratic Republic of Congo, the government of South Sudan initiated health promotion and education campaigns as a strategy to inform the public about Ebola disease, how it is spread and the ways through which we can prevent the spread and the immediate medical attention to be sought in case of a suspected case. The strategies include radio and TV campaigns as well as print media including leaflets.

In this case I will talk about the Television campaign mass media. This is where the government records a film that is played in the television station for the viewers to be able to capture the content of the video regarding Ebola. In the video, the government of South Sudan explained the way how humans got infected with the virus causing the disease from the wild animals such as bats, what needs to be done to prevent infection such as washing all fruits and salads with safe and clean water, not eating fruits that have been eaten by bats and how to prevent the spread of the disease from one person to another through not touching body fluids of infected persons such as blood, urine, sweat, vomitus and faeces and proper through hand washing with soap and water where the hand washing is properly demonstrated in the video for the viewers to copy and practice following the steps outlined.

This mode of communication (Television) had both advantages and dis advantages as follows;

**Advantages**

* With television communication campaigns combining sight and sound, it gives the real description of actions to be done both by demonstrating followed by a vocal sound that makes it more understood than when only a vocal one is used or the picture. As compared to other mass media such as radio the actions are observed as demonstrations are performed practically in the video such as the hand washing demonstration.
* Television communication campaigns grab a lot of attention. The way things are performed makes people to imitate as they are performed with a lot of fun that everyone feels like doing it. Like in South Sudan, due to the hotness, people place and watch their televisions outside and as other people pass by, they get attracted and always gather in that compound to watch the television program running.
* Television raises empathy and emotion as real pictures of persons suffering from the disease are shown in colored videos and the exact or real situation is shown as is creating the empathy of people hence taking the desired action.
* It also reaches out to a wide targeted audience as it can be viewed by people in other countries planning to visit the country with Ebola or at high risk.
* Television adverts or communication allows recall of the actions or pictures due to the beautiful colored demonstrations.
* Even if only for a few seconds, a Television advert puts only your product in the spotlight. This means that, when it is time for the message such as the Ebola campaign, it will be the only advert to run at that time ensuring the message is not distracted by other similar adverts to change the meaning of the message. This contrasts with newspapers, telephone directories or other print media where adverts may be relatively small and placed directly alongside competitors which can detract audiences.

**Disadvantages/ Limitations**

The disadvantages of Television as a mass media in communication campaigns of public health strategies are the following;

* Its expensive both in terms of production and airtime compared to the radio advertisement.
* It is limited to access by those who own television sets yet the poor who can not afford a television set are more at risk as they may be staying in proximity with wild animals.
* The television requires electricity or generators to power hence limiting it to those with stable electricity. South Sudan lacks electricity with most of the city residents powering their electrically powered machines using generators. This therefore means that the message passed was only limited to people who have electricity or can afford generators to power their television.
* This is a media, which attracts people or its creative commercials. But on the other hand, it has a limitation also that attention paid by viewers is limited because of increase numbers of commercial adverts, channel zapping or changing channels to avoid commercials, zipping i.e. forwarding through commercials if watching a prerecorded movie.
* Editing a television advert is difficult and expensive as compared to a print media and radio.
* Unlike radios, it is difficult to carry the television set along with you when leaving the house say like to go jogging or visiting friends and relatives. This means that messages relayed that time will be missed.

1. *What is patient centered care communication and how it has improved service delivery for public Health Professionals?*

Patient-centered care is defined as the practice of caring for patients (and their families) in ways that are meaningful and valuable to the individual patient.  It includes listening to, informing and involving patients in their care and decision making. The Institute of medicine (IOM) defines patient-centered care as: “Providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions; it is a partnership among practitioners, patients, and their families to ensures that decisions respect patients’ wants, needs, and preferences (Patient autonomy), and that patients have the education and support they need to make decisions and participate in their own care, as well as participate in quality improvement efforts (Institute of Medicine, 2001). The health service provider provide education to the patient regarding alternatives of their care as well as the pros and cons of the alternatives for their informed decision making.

Improving communication between patients and their providers is crucial to reforming the health care system to better meet patients’ needs and improved patient outcomes. Strategies such as shared decision making and patient-centered medical homes, which encourage patients to play an active role in their health care and rely on strong patient-provider relationships, are founded on trust and communication (Long S. et al, 2017). The main aim of patient centered care is to have improved patient health outcomes. All strategies aimed at meeting a patient centered care including patient centered communication are key component of patient centered care aimed at improving the outcomes as well as building confidence and relationship between the provider and the client (patient).

A patient-centered approach to communication is to acknowledge the person holistically, their personality, life history, and social structure in order to develop a shared understanding of the problem, the goals of treatment, and the barriers to that treatment and wellness.

The quality of communication both in the history-taking segment of the visit and during discussion of the management plan was found to influence patient health outcomes (Moira A S, 1995). Patient centered communication improves patient centered care which has improved service health delivery for public health professionals in the following ways;

* Improved satisfaction scores among patients and their families for health service providers or public health professionals. This will lead to improved performance of the service providers. When patients or clients rate you with a high score in the service delivery surveys, it gives morale to the staff and therefore improved service delivery hence better health outcomes.
* Enhanced reputation of providers among health care consumers. The more the reputation of a provider is enhanced by trust of client, the more the service is sought by clients. This means that when your patient centeredness is appreciated by the clients, it leads to winning of more trust from the public and hence increased service attendance or usage by the public. When more clients seek healthcare services in a there will be improved public health status for the community.
* Better morale and productivity among clinicians and auxiliary staff. When your output is appreciated, and you even see that there is increased output from your work it energizes you hence improved morale. Better moral means better patient centered service and thence better client satisfaction and health outcomes.
* Improved resource allocation. Taking for instance two separate government health facilities at same grades, when one of the two facilities practice patient centered care which gives out better client satisfaction and health outcome, it means more and more clients will visit that particular facility and evidenced with the more patients visiting such facility, the government will be able to allocate resources appropriately basing on the number of clients attending those facilities. It helps a lot in planning and distribution of resources.
* Reduced expenses and increased financial profit margins throughout the range of care. Having more clients means making more financial gains in the case of a private for-profit organizations such as privately-owned medical facility. It may also mean that resources are not wasted in terms of medicine wastages.

1. *Explain any six ways in which computer technology has improved service delivery in healthcare supporting your answers with practical examples.*

Computer technology is the design and construction of computers to better help people at work, school, home, etc. Computer technology including communication and information technology has improved healthcare service delivery in several ways including;

**Predict medical trends with online databases such as outbreak of epidemic**

Technology such as the internet allows patients access to information including information about disease symptoms and signs. As they do so on search engines which keep record of the frequency of search of such symptoms related to diseases, public health research can then easily predict epidemic outbreaks. For example, if people in an area start searching on the google search engine symptoms such as ones related to flue and more and more people search for those same symptoms it means such is happening in that area. For an epidemic to be declared, it always starts small with it affecting few people until when the threshold is reached. This means that technology allows research the ability to predict an outbreak of an epidemic as the search frequencies keep on being stored.

Technology has also made it easy to predict outbreaks using software such as health information systems including the DHIS that can show trends as data is always entered into the software which can be viewed anywhere by those intending to use it.

**Doctors Embracing Mobility/improved communication**

Because of smartphones, doctors are easier to get ahold of and are better at doing their jobs. Patients can call and consult their doctors on phone or using social media to get the problem sorted by the doctor who may be far away. The use of telemedicine or telecare is a good example of getting InTouch with a doctor who is far from the patient.

Smartphones and tablets allow doctors to access online medical databases as well as thousands of pages of medical text while on the go making it a better way to allow doctors work as they are doing their own other things.

**Quick Computerized Testing and Imaging technology**

The current medical tests used in healthcare are more informative than ever before. We now have advanced monitoring and imagining capabilities like Electrocardiography, X-ray Computed Tomography, Sonography and Magnetic Resource Imaging as well as computerized laboratory testing equipment such as the automated chemistry analyzers, Complete Blood Count machines which are automated GeneXpert machines used in the diagnosis of diseases in healthcare. These automated computerized machines have saved the long hours of hustle medical professionals such as Laboratory technologist and radiologists used to go through. The automation of these diagnostic machines did not only save waiting time but also eliminated errors that could have occurred due to human errors. This means that these has improved service delivery as longer waiting time is eliminated and better results are provided for proper diagnosis.

**Huge data storage using electronic databases**

The use of electronic health records and personal health records using a computerized technology has made it easier and safer to store huge data in just a small device. The data that could have filled a full huge room can now be stored in just a small device or using iCloud. The filing of health records on hard copies means keeping heaps of medical files of all the population attending their health seasons in that health facility. This creates a big room for all the files making it difficult in retrieving patient files by the data clerks leading to longer waiting times for the patients. Longer waiting time is one factor that affects health outcomes and therefore poor healthcare delivery.

The electronic health records also allow the doctor to have access to past records of the patient which helps greatly in clinical decision making for both the healthcare provider and the patient. For example, when treating a patient with high cholesterol, the patient is encouraged to do some physical activity as well as monitor on his or her diet in order to lower the cholesterol level, therefor as electronic health records allow one to see past lab results, the patient will be able to appreciate or blame his lifestyle hence making him or her to take a decision regarding his/her life style. If the cholesterol trend is decreasing, the patient will be able to appreciate the changes in his/her lifestyle which has led to the improvement in the cholesterol level. The doctor as well will use the past history to either change the medication a patient has been taking that is not giving any improvement or change the dosage such as is the case with Diabetes.

**Less medical errors with remote monitoring devices**

One of the most useful and practical innovations in recent years is remote monitoring technology. Home monitoring systems such as the mobile blood glucose monitoring machine can be used by patients in the comfort of their home to reduce the time and costs associated with recurring visits to the doctor. These devices are cost effective and easy to use making it easy for the patients to monitor their health status.

Today individuals, especially elders who may require more medications than the average person, are able to wear special medical bracelets which are equipped with an individual barcode to help other hospitals track doses of medications, which reduces errors.

Other bracelets such as the heart rate monitors and blood pressure monitors are wearable devices to monitor heart beat rate and blood pressure from time to time in order to be sure of fluctuations.

The Internet is also a helpful tool in reducing prescription mistakes because there are many available web sites that tell you all you need to know about a drug, even if you lost the bottle it came in.

Message alerts are also sometimes sent out to the older people as reminders to take their medications to remove errors of missing taking the drug. This results to better health outcomes and reduce drug resistance in the disease agent such as bacteria which become resistant to the antibiotic if not taken as required.

**Mobile apps**.

Technology has brought the development of apps developed for almost everything such as the app designed to monitor body activity. An app developed to count steps taken by one keeps counting and when the user sets a target this app will alert him or her that the target has been reached for that day. This means that individuals are better able to monitor their physical activity which is a key factor in managing chronic diseases such as cardiovascular diseases and diabetes. Once the alarm or alert is not heard then it means the individual hasn’t reached the target and there is need for more exercises. These apps have been developed so many to solve so many health problems others including app for measuring blood cholesterol and glucose promoting wellbeing.

1. *How the mobile phone has affected on the management of diabetes*

A mobile phone, cellphone, or hand phone, sometimes shortened to simply mobile, cell or just phone, is a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area. The radio frequency link establishes a connection to the switching systems of a mobile phone operator such as MTN or zain in the case of South Sudan, which provides access to the public switched telephone network (PSTN).

A mobile phone is a wireless handheld device that allows users to make and receive calls and to send text messages, among other features. The earliest generation of mobile phones could only make and receive calls. Today’s mobile phones, however, are packed with many additional features, such as web browsers, games, cameras, video players and even navigational systems.

The Mobile phones or the cell phones developed as an advancement in technology development and it has eased life in so many ways. Previously access to telephones was only limited to areas with the network coverages and only those with money (the rich), however, as of now mobile phone coverage has increased due to globalization and this easy-to-use technology is widely accessed by the illiterate and poor (Vital Wave Consulting, 2009).

According to the Pew Research center, 96% of Americans own a cellphone of some kind and 81% of these own a smart phone (Pew Research Center, 12 June 2019). Two-thirds of all mobile phone users live in low-income and low–middle-income nations (United Nations, 2007).

Diabetes a chronic disease requires multidisciplinary care, and the patients require education on self-care such as blood-sugar monitoring, adherence to recommendations on diet, exercise, and regular foot inspection. The education required here therefore means a wider access to information about the chronic disease by the patients which can easily be achieved by the advances in technology including mobile telephones as evidenced by many researches.

The mobile phones have therefore, positively affected the management of diabetes positively in a number of ways majorly subdivided into three groups according to the benefit it offers as listed below;

* Benefit for the health system
* Benefit for the physicians and
* Benefits for the patients

**Benefits to the Health System**

#### **Diabetes Registries**

With the development of technology, mobile phones through the use of internet has helped the health system in the creation of registries to reduce medical errors and improve quality of care and promote evidence-based medicine through the use of electronic health records which can be done by the use of internet enhanced mobile phones for selected health facilities in order to be able to manage records that may not be that huge. This allows for easy tracking of patient data.

#### **Information Dissemination**

Cell phones, being universal and portable, are an alternate medium for propagating simple messages on understanding of the signs and symptoms, risk factors, long-term complications, and ways to live with diabetes. Health service systems such as the Ministry of health or other organizations specializing in the management of diabetes can use the mobile service providers to disseminate messages about diabetes through SMS that can reach a wider circulation. Messages such as signs and symptoms of diabetes can be sent for the public to monitor signs and symptoms of diabetes for early detection.

Another purpose of SMS could be that a health system will send messages regarding new developments in the diabetes field such as new drugs in the market. This will improve the management of diabetes by the health systems.

#### **Supporting Evidence-Based Management**

With the electronic health records, mobile phones have improved the management of diabetes through evidence-based management of this chronic disease.

Quinn and colleagues carried out a pilot trial to examine the health care provider's adherence to prescribing guidelines using a cell-phone-based diabetes management tool. The results from this study were encouraging, as it facilitated treatment decisions, provided organized data, and reduced logbook review time for analyzing patient data trends (Quiin CC et al, 2008).

#### **Laboratory/Diagnostic Applications**

Developing countries have been deprived of laboratory facilities and expensive manpower such as physicians leaving health facilities in rural areas of low- and middle-income countries to be manned by medical assistants or even persons trained on job such as village health teams, thereby seriously affecting access to diabetes care. Most health service centers in such facilities lack diagnostic equipment to diagnose diabetes despite 70% of people with diabetes live in Low- and Middle-income countries (IDF, 2009). However, with the Bluetooth-enabled glucometers integrated into cell phones it has made it affordable to diagnose diabetes through this innovation in these settings. Clinicians have been able to use these devices to screen for diabetes resulting to timely diagnosis of diabetes without using expensive innovations that requires trained experts to run them.

#### **Remote Monitoring**

Telemedicine and telemonitoring are some key developments technology have brought that are good in the management of diabetes through electronic monitoring of diabetic patients. The health systems can use these devices (phones) to monitor diabetic patients remotely.

### **Benefits to Physicians**

***Vital Information and references***

Clinical guidelines and advice and alerts for physicians can be easily delivered through cell phones to stay informed about recent developments (Sarasohn-Kahn J. Oakland, 2010).

Clinical guidelines can be accessed through smartphones in order to eliminate errors while also information regarding developments such as new evidence-based research findings can be shared, and the physicians can access through the smart phone which is key in management of diabetes. This means that the doctor gets UpToDate knowledge about the disease. Such information can also be used by low cadre professionals in remote poor settings where physicians may not be available to provide the specialized care.

***continuous medical education (CME)***

Science keeps on changing and so does technology, continuous medical education is key to enable medical professionals gain an in-depth knowledge about new developments in the medical field. This has been made easier by the wider coverage of mobile phones where professionals can discuss and share ideas online in specific forums.

### **Benefits to Patients**

### ***Patient education***

### Cell phones, being universal and portable, are an alternate medium for propagating simple messages on understanding of the signs and symptoms, risk factors, long-term complications, and ways to live with diabetes unlike the newspapers, television and radios. Patient education and self-management are important components of good diabetes care. Simple-to-follow and always-with-you being a small mobile phone to move with everywhere one goes, it provides information on the go which will have the maximum influence on persons with diabetes to make positive choices on diet, physical activity, and compliance to therapy because of the easy access to the information.

### Cell phones can host software applications that are programmed to provide encouraging messages to remind them of adherence to medication, food intake, physical activity information, and more.

### ***SMS reminders on medication***

One study compared two groups of individuals with diabetes in which one group was requested to input their blood glucose levels weekly for 3 months to a Web site using their cell phone. This group received weekly optimal recommendations for 3 months using SMS while the other group received usual care. Participants in the intervention group had a significant mean change in the 2 h post meal glucose level while those in the control group had no difference (Kim HS, 2005). This means that the cellphone SMS reminders had a tremendous impact on diabetes management.

Other SMS can be initiated by the service providers to their clients (diabetic patients) reminding them about their medication dosages and time for taking the medications. This will eliminate the error of skipping taking the antidiabetic drug.

Therefore, generally cellphones have a tremendous positive improvement in the prevention and management of diabetes through the different mentioned effects and benefits above, however, there is still need to research more on the benefits of mobile phones in this area because some of the benefits don’t seem to only be linked to mobile phones but to other technological advances such as the internet although the cell or mobile phone make the internet more accessible to many.

1. *What are some of the advantages and disadvantages of computer technology in public health?*

According to WHO, Public Health is defined as “the art and science of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals (Acheson, 1988; WHO).

Computer technology is the design and construction of computers to better help people at work, school, home, etc. It encompasses developing a list of different software programs and devices including programming, networking, database design and development.

As the saying goes that, the same heat that softens the yam hardens the egg so is Computer technology. Computer technology has been of both advantage and disadvantage to public health in its function of preventing disease, prolonging life and promoting health. Below are some of the advantages and disadvantages of computer technology to public health;

**Advantages**

**Public Health informatics and Prediction of outbreak of epidemic**

Public health informatics is the systematic application of information and computer science and technology to public health practice and learning which applies mathematics, engineering, information science and social sciences for analysis and management of public health problems and processes in a faster and cost-effective way.

Technology such as the internet allows patients access to information including information about disease symptoms and signs. As they do so on search engines which keep record of the frequency of search of such symptoms related to diseases, public health research can then easily predict epidemic outbreaks. This means public health function of disease surveillance is enhanced with development of computer technology.

**Computerized Laboratory Testing and Imaging technology**

The current medical tests used in healthcare are more revealing than ever before. We now have advanced monitoring and imagining capabilities like Electrocardiography, X-ray Computed Tomography, Sonography and Magnetic Resource Imaging and including imaging and treatment machines such as the ones used for radiotherapy as well as computerized laboratory testing equipment. This technology has an advantage of promoting health through timely diagnosis and treatment of diseases. This has made public health better in terms of disease diagnosis and treatment including cancer.

**Mobile apps for health promotion and protection**

Technology has brought the development of apps developed for almost everything such as the app designed to monitor body activity encouraging the users to get involved in physical activity which is key in fighting chronic diseases such as diabetes and cardiovascular diseases. Technology has introduced computerized machines some of which are worn on the hand such as the bracelet and smart watches to monitor parameters such as heart rate and blood pressure are also examples of computer technology advances that has greatly impacted public health positively.

Other apps such as for measurement of blood sugar and cholesterol have all been important in the diagnosis of diseases in the public health service delivery.

#### **Information Dissemination**

With the development in technology and computer technology in particular, dissemination of information such as for public health promotion and education has been made easier and faster as more and more people access the internet through computers and even mobile phones and tablets.

The internet has also made it easy for public health professionals to have forums to share ideas and discuss important public health issues and topics. People have been able to consult on public health issues with colleagues globally by the use of internet.

Also relating to information dissemination and sharing is the sharing of experiences from people with the same disease who will give the other people an insight knowledge about their experiences with the disease which include bodily changes and the aftereffects of illness and drugs. This allows the patients to have trust and courage in the management of the disease.

**Reduced time between diagnosis and treatment**

With the invention of modern computer technologies, the time between diagnosis and treatment of disease has been shortened as the diagnostic equipment which are computerized are able to give timely and accurate results.

Also, another technology that has shortened the waiting time in hospitals is the use of electronic documentation of patient records which makes the work done by registration and billing clerks simpler and quicker while eliminating errors.

**Data Storage/ Health Management Information Systems**

Public health deals with documentation of huge data which if not because of the use of technology will occupy a huge room for just a county record. Computer technology however has made it easy to store huge epidemiologic data in just a smaller device that can easily be kept even in the pocket.

Also, the use of electronic documentation makes data available to public health professionals for easy access for research and decision making or planning purposes.

The use of Health Management Information Systems (HMIS), a tool for aggregating, analyzing and using the information generated for taking actions to improve performance of health systems helps in the easy aggregation of data, reduces workload on Public health field staff, strengthens decentralization and hence improves ability of the lower level public health administrative units and it is a tool for policy and strategy making at national levels as well as monitoring of the Public health program implementation when it is web based.

**Improved communication between patient and physician**

Where a patient is being seen by different clinicians as is the case in Africa, communication between patients and the clinicians is improved by electronic health records. Clinicians can access patient information anywhere using the electronic health records unlike when it had been hindered as patient records had to be shared between providers. Electronic health records are comprehensive database of information that can be viewed and used by authorized users when and where they need it.

The EHR help in bridging the geographical and temporal gaps that exist as it is important that all clinicians know both past and present history (Mandl, Szolvits & Kohane, 2001) of the patient who might have travelled to see another doctor far away from his home area.

**Telemedicine**

The World Health Organization (WHO) defines telemedicine as the delivery of healthcare services where distance is crucial factor by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation and for the continuing education of healthcare providers all in the interest of advancing the health of individuals and their communities (Dasgupta A & Deb S, 2008).

This technology can work well in healthcare delivery in places where access to some other areas such as is the case with South Sudan with poor infrastructure. It works well in places where healthcare for rural and geographically distant population. It would have worked well in this our country as it is working well in India if not because of the high level of corruption in the country.

**Reducing on Global Warming**

With the use of computer technology in healthcare service provision facilities such as the hospitals and Public Health departments, there is little or reduced usage of papers. This means less and less of the vegetation is used to make more papers while conserving our environment with the going green strategy which is a good way of fighting global warming.

**Disadvantages**

**High Cost of Equipment**

The high cost of purchasing the right computer equipment, including a high amount of computer memory and store, is one disadvantage to computer technology. Unlike using the olden paper and file method of keeping records, the computer technology is expensive. The cost of buying a computer for each employ will drain the budget of the project unlike buying a pen and a ream of paper for each employee.

**Employee Morale and Subjectivity**

With a computer making decisions, certain managers may feel that their own decision-making skills aren't seen as important, which can diminish employee morale leading to poor performance of the employee and hence depression. Also, unlike people who can be subjective and rational, computers can only be rational. By eliminating subjectivity in the decision-making process, the result may lack certain elements you are concerned about such as in research findings.

**Unemployment**

Computer technology has created a wide gap of unemployment as the technology can make robots that can be used to work in a factory. This will lead to low income and hence poor health standards of the high unemployed population.

**Potential of loss of privacy**

With the use of computer technology in storage of personal data and information and now being connected to the Internet, there is a potential of losing the stored data to hackers.

**Causes anti-social behavior or depression**

Computer technology has created addictive applications such as games and the social media platforms such as Facebook and WhatsApp. These applications keep people especially youths busy to themselves in the real world. it is easy to get obsessed to the point you become anti-social which is a mental illness. Social network sites can be depressing because people on these social sites only show all the good, fun, and interesting things friends and family are doing leaving out the real facts of life they are going through. This can result in other people believing that other people's lives are so much better than theirs, hence depression and a times suicide.

**Carpal tunnel and eye strain**

A computer requires a lot of repetitive movement that can lead to Carpal tunnel syndrome which is also known as RSI or repetitive strain injury, is the swelling of small blood vessels, usually in the hands or wrists. This pressure on the nerve disrupts its function causing numbness, pain, and a loss of manual dexterity. For example, moving the hand from the keyboard to a mouse and typing are all repetitive and can cause injuries.

Also, the constant looking into the computer screen can cause strain of the eyes due to dryness and the bright light from the computer screen.

1. *With one example, explain prevention of Sexually Transmitted Diseases*

The center for Disease prevention and Control (CDC, 2016) defines Sexually transmitted diseases (STDs) as infections that are passed from one person to another through sexual contact although they may not exclusively be transmitted through sexual intercourse. Some such as HIV/AIDS, Hepatitis B and syphilis can be transmitted through other means other than sexual intercourse such as blood transfusion or from mother to unborn baby. The causes of STDs are bacteria, parasites, yeast, and viruses. There are more than 20 types of STDs, including Syphilis, Hepatitis B and C, Human papilloma Virus (HPV), HIV/AIDS, Chlamydia, Genital Herpes and Gonorrhea.

Most STDs affect both men and women, but in many cases the health problems they cause can be more severe for women. If a pregnant woman has an STD, it can cause serious health problems for the baby or even abortion.

Sexually transmitted diseases can be prevented through the following ways;

**Abstinence**

Abstinence is a self-denial of something. In this case abstinence from sex is a sure way through which sexually transmitted diseases can be prevented regardless of the different types of STDs/STIs. Since STDs are transmitted through sexual encounter, avoiding sex means avoiding the infection with these sexually transmitted diseases.

**Mutual monogamy/ Being faithful**

Mutual monogamy means that you agree to be sexually active with only one person, who has agreed to be sexually active only with you. For example, when you choose to be faithful to your partner it means you and your partner will never have sexual encounter outside your relationship or marriage. When arranging for a marriage, the partners will first have to screen for sexually transmitted diseases to be sure of their health status and after the screening when all are safe, they then stick to having sex only and only with this partner whom they have tested for the sexually transmitted diseases. Since it is sexually transmitted, if the two partners are faithful to each other that they do not go out for sexual encounters outside their mutual monogamous arrangements, the partner will remain free of the sexually transmitted diseases. One of the diseases this has been practiced preventing its spread is HIV/AIDS.

**Use Condoms**

Condom is a thin sheet of plastic sheet of latex used during sex to prevent contact. Proper and consistent use of a condom is a safer way to prevent the infection with sexually transmitted diseases such as HIV/AIDS, syphilis and gonorrhea. The condom prevents the disease-causing agent such as the virus or bacteria from crossing over from one partner to the other.

**Vaccination**

Sexually transmitted diseases such as Hepatitis B can be prevented through vaccination. Other diseases that can also be prevented through vaccination is the HPV which is also transmitted sexually.

**Reduced number of sexual partners**

The more the number of sexual partners you have the higher chances of acquiring the sexually transmitted diseases. Limiting the number of sexual partners is a way of preventing sexually transmitted diseases such as HIV/AIDS, Syphilis and Gonorrhea. For example, when a man has three wives, he is supposed limit his sexual partners to the three wives who will only have sex with him encouraging the zero-grazing practice among the three wives. This means that when the man limits his sexual partners to only his wives the wives will be safe from sexually transmitted diseases that the husband or another one of them could have brought from outside partners. This means therefore that the women also limit their sexual partner to only their one husband.

**Early detection and treatment**

Antibiotics can treat STDs caused by bacteria, yeast, or parasites. There is no cure for STDs caused by a virus, but medicines can often help with the symptoms and keep the disease under control.

When the disease such as syphilis is detected early and treated early, it means the chain of transmission will be cut therefore preventing the transmission to another person.

References

1. Acheson D., (1988).  Acheson Report: Independent Inquiry into Inequalities in Health Report. London.

2. Albert Tuman (25 September 2019). Healthcare Technology Featured Articles. *Impact of Technological Innovations in Healthcare.* http://www.healthtechzone.com/topics/healthcare/articles/2019/09/25/443350-impact-technological-innovations-healthcare.htm (Accessed 30/09/2019).

3. Bianca Banova, (June 2, 2019). The Impact of Technology in Healthcare. *American Institute of Medical Sciences and Education.* <https://www.aimseducation.edu/blog/the-impact-of-technology-on-healthcare/> (Accessed 03/10/2019).

4. Centers for Disease Control and Prevention*,* (January 21, 2016)*.*  [Division of STD Prevention](https://www.cdc.gov/std/dstdp), [National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention](https://www.cdc.gov/nchhstp), [Centers for Disease Control and Prevention](https://www.cdc.gov/).

5. Dasgupta A, Deb S, (2008). Telemedicine. A New Horizon in Public Health in India. *Indian Journal of Community Medicine. 2008; 33:*3-8.

6. Edwin Chadwick, (1842). Edwin Chadwick's Report on the sanitary conditions of the laboring population of Great Britain <https://ia802707.us.archive.org/30/items/reportonsanitary00chadrich/reportonsanitary00chadrich.pdf> (Accessed 26/09/2019).

7. Fracastoro G, Wright WC, (1930). Hieronymii Fracastorii De Contagione, Libri III, Translation and notes. New York: London: G. P. Putnam's sons; 1930.

8. <https://catalyst.nejm.org/what-is-patient-centered-care/> (Accessed 03/10/2019).

9. <https://www.britannica.com/topic/public-health>.

10. <https://www.merriam-webster.com/dictionary/technology> (Accessed 27/09/2019).

11. International Diabetes Federation (IDF), (2009). *International Diabetes Federation*. 4th ed. Brussels: IDF diabetes atlas.

12. [James W. Carey](https://www.google.com/search?tbo=p&tbm=bks&q=inauthor:%22James+W.+Carey%22),(1992).Communication as Culture. *Essays on Media and Society*.

13. John Graunt, (1899). Natural and Political Observations Made Upon the Bills of Mortality. Edited by Charles Henry Hull. <https://en.wikisource.org/wiki/Natural_and_Political_Observations_Made_upon_the_Bills_of_Mortality_(Graunt_1676)> (Accessed on 26/09/2019).

# 14. [Karehka Ramey](https://www.useoftechnology.com/author/usetekadmin/), **(**December 12, 2013**)**. What is Technology? Meaning of Technology and itsUse<https://www.useoftechnology.com/what-is-technology/> (Accessed 27/09/2019).

15. Kim HS, (2005). Effects of Web-based Diabetic Education in Obese Diabetic Patients. *Taehan Kanho Hakhoe Chi, 35*(5):924-30.

16. [Mandl KD](https://www.ncbi.nlm.nih.gov/pubmed/?term=Mandl%20KD%5BAuthor%5D&cauthor=true&cauthor_uid=11157533), [Szolovits P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Szolovits%20P%5BAuthor%5D&cauthor=true&cauthor_uid=11157533), [Kohane IS](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kohane%20IS%5BAuthor%5D&cauthor=true&cauthor_uid=11157533), 2001. Public standards and patients' control: how to keep electronic medical records accessible but private. [*BMJ.*](https://www.ncbi.nlm.nih.gov/pubmed/11409406)*2001 Jun 2;322*(7298):1368-9DOI: [10.1136/bmj.322.7281.283](https://doi.org/10.1136/bmj.322.7281.283)

17. MSF, (2019). DRC Ebola Outbreak. *Crisis Update 23 September* <https://www.msf.org/drc-ebola-outbreak-crisis-update> (Accessed 01/10/2019).

18. MSF, (23 September 2019). DRC Ebola Outbreak. *Crisis Update 23 September 2019.*

19. [Ole Benedictow](https://www.historytoday.com/author/ole-j-benedictow), **(2005). The Black Death: The Greatest Catastrophe Ever.** [*History Today*](https://www.historytoday.com/archive/history-today/latest)[*Volume 55 Issue 3 March 2005*](https://www.historytoday.com/archive/history-today/volume-55-issue-3-march-2005)*.*

20. Ole J. Benedictow, (1996). ‘Plague in the Late Medieval Nordic Countries’, Epidemiological Studies.

21. Pew Research Center (12 June 2019). Internet and Technology. Mobile Phone Ownership Over Time. *Pew Research Center*. https://www.pewinternet.org/fact-sheet/mobile/ (accessed 30/09/2019).

22. Quinn CC, Clough SS, Minor JM, Lender D, Okafor MC, Gruber-Baldini A (2008). WellDoc Mobile Diabetes Management Randomized Controlled Trial: Change in Clinical and Behavioral Outcomes and Patient and Physician Satisfaction. *Diabetes Technol Ther. 2008 Jun; 10*(3):160-8.

23. Sarasohn-Kahn J. Oakland, (2010). California Healthcare Foundation. How Smartphones are changing health care for consumers and providers.

# 24. [Sharon Long](https://www.healthaffairs.org/do/10.1377/hauthor20100922.450062/full/), [Lea Bart](https://www.healthaffairs.org/do/10.1377/hauthor20171011.758027/full/) & [Katherine Hempstead](https://www.healthaffairs.org/do/10.1377/hauthor20121227.238887/full/) (September 22 2017). Patient-Centered Care Starts With Patient-Provider Communication <https://www.healthaffairs.org/do/10.1377/hblog20170922.062078/full/> (Accessed 02/10/2019).

25. Stewart A. Moria, (1995). Effective Physician-Patient communication and Health Outcomes. A Review Institute of Medicine (2001). [“Crossing the Quality Chasm: A New Health System for the 21st Century”](http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf) <http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf> (Accessed 02/10/2019).

26. UNICEF, (22 August 2017). *South Sudan Cholera Situation Report – 22 August 2017.*

27. United Nations Department of Economic and Social Affairs, (2007).  *Compendium of ICT Applications on Electronic Government. Vol 1*. Mobile Applications on Health and Learning. United Nations, New York 2007.

28. Vital Wave Consulting (2009). *UN Foundation–Vodafone Foundation Partnership*. mHealth for development: the opportunity of mobile technology for healthcare in the developing world. Vital Wave Consulting. Washington DC: 2009.

29. WHO, (1948). WHO Constitution.

30. WHO, (2012). Role of Modern Technology in Public Health. Opportunities and Challenges. *WHO South East Asia Journal of Public Health 2012; 1*(2):125-127.