



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

**A COMPARATIVE ANALYSIS OF ARTIFICIAL INTELLIGENCE IN MOBILE
HEALTH CARE AND ITS IMPACT ON HEALTH CARE NETWORKING – A
CRITICAL PERSPECTIVE ON HEALTH CARE SYSTEM**

**REVATHI.R¹, VISHAL PRAKASH^{2*}, LESKO NATALIA VLADIMIROVNA³,
KORNIENKO DMYTRO MYKOLAIOVYCH⁴ AND SOLODKA OLENA
MARKIJANIVNA⁵**

1: Assistant Professor, Department of Computer Science, Karpagam Academy of Higher Education, Coimbatore, India

2: Assistant Professor, Department of Geography, Shivharsh Kisan P.G.College, Basti, U.P. (Siddharth University), India

3: Professor, Department of Administrative and Information Law, College Lviv State University of Internal Affairs, Ukraine, Lviv

4: Associate Professor, Special disciplines and professional training, National academy of the National guard of Ukraine, Ukraine, Kyiv

5: Senior Researcher, Special disciplines and professional training, National academy of the National guard of Ukraine, Ukraine, Kyiv

***Corresponding Author: Vishal Prakash; E Mail: vishal.geog@gmail.com**

Received 19th July 2021; Revised 20th Aug. 2021; Accepted 29th Sept. 2021; Available online 1st Nov. 2021

<https://doi.org/10.31032/IJBPAS/2021/10.11.1012>

ABSTRACT

The term mobile health care (M-Health) is stated as the usage of smart phones and other related devices in monitoring the health of the individuals in an effective manner. The growth in technology and advancements in medical sciences has enabled in creating new and effective means of monitoring the health of the individuals and provide better care in order to enhance their health and wellbeing. The growth of artificial intelligence (AI) and predictive data analytics has enabled in enhancing the critical health care networking among the patients and medical practitioners in an effective manner.

Different types of data like the medical records, images, vaccine and drug related and complicated text aspects needs to be analysed and interpreted so that better care can be provided to the patients. The implementation of mobile devices assists in the evolution of various systems which comprises of mobile devices, medical based sensors and other portable applications.

The implementation of M-Health is gaining its popularity as it assists the medical practitioners and patients in better engagement, provide better assistance and maintain data in an effective manner for effective analysis. These devices enable in offering better support in vulnerable situations through enhancements in network and application of AI. This paper intends to make a conceptual analysis on the application of AI in M-Health care and its impact on health care networking.

Keywords: Mobile health, Artificial Intelligence, Health care networking

INTRODUCTION

Mobile health care is mainly stated as the application of mobile based devices like portable monitoring systems, personal gadgets, smart phones, smart wearables and other wireless devices which enables in tracking, recording and storing critical information relate to medica and public health. This process enables in creation and application of smart phone which is considered as the key benefits involving voice based and short messaging. The medical services and practitioners tend to use this mobile application for monitoring heart rate, blood glucose levels and other aspects enable in understanding and tracking the sleep patterns, cardio vascular aspect etc which will enable in understanding the health and wellbeing of the individuals.

Furthermore, the mobile health care application intends to use more complicated services like the GPRS using 4th and 5th generation mobile technologies, viz., 4G and 5G networks. [1]. The implementation of big date enables in collecting, storing, analysing and reteeing the data on a real time basis so as to make informed decision making. In the health care industry, artificial intelligence (AI) enables in generating and saving medical images, clinical information, drug related data, prescriptions provided by medical doctors, recent test results, monitoring the health of the individuals on a real time basis, support in processing insurance and enable in offering better and efficient medical services to the individuals. Hence, the technology is gaining more importance

around the globe as it supports the stakeholders in an effective manner.

The AI enabled mobile based health care services enable in analysing the general health, implementation of fitness-based application in the smart phones, collect and store information related to medicine based and managing the health care in an effective manner. The concept of AI influenced mobile health care services is being generally mentioned as M-Health is considered as a unique application which enables the individuals to use portable devices like wearable device, smart phone application and other technologies related to health care information for enhancing the health care services. [2]. M-Health enable in creating better health networking services which support in tracking the health and wellbeing of the individuals., generate key vital data like blood glucose levels, blood pressure, cardio information etc. It also provides the facilitation of wireless based communication, get in touch with the medical practitioner, record drug related information and embed other technologies for supporting better health care services.

The researchers and practitioners have stated that there exist many advantages of applying AI in the mobile health care systems as it enables in offering better services covering collection, transmitting

and analysis of real time information so as to offer instant and personalised informatics for the medical practitioners which enable in enhancing the health care services. The application of AI in M-Health which also enable in creating better health care networking, these aspects are highly helpful in monitoring the health status of the patients and enhance quality of services to the individuals.

It is further noted that the implementation of mobile based health care systems is gaining more popular in the developing countries like China, India, Malaysia, UAE etc. these technologies support the government and health care centres to offer remote assistance, enable in quick data collection, monitor the health in real tie and offer suggestions and guidance so that the individual can improve their health and wellbeing, furthermore the cost involved in upgrading the technologies is less. [3] The technology can also support in quicker communication and improve the services. It is noted that the userbase of smart mobile devices is constantly increasing and is expected to reach around 3 billion by end of 2022. This enables in increase the application of M-Health around the world, the low-cost smart devices and implementation of 4G and 5G network has enabled in supporting the implementation of M-health.

AI is considered as the critical aspect of using the overall intelligence of machines, Machine Learning is considered as the subset of AI which lays out the critical systems so as to state the capability to understand the data and information and analyse them for providing critical support in decision making. It also places more emphasis on using algorithms and other aspects for delivering better results. Due to its enhanced capabilities and other related features, many industries have started to use the power of AI, in case of health care

industry AI is highly useful in delivering different support to the health care professionals and others so as to analyse the patient data, store the past information of the patients so as to offer better services, also creating efficient healthcare networking. M-Health enable in implementing AI for analysing heart related issues and other aspects, the doctors are using different methods in order to generate alerts and focuses in identifying the heart failure.

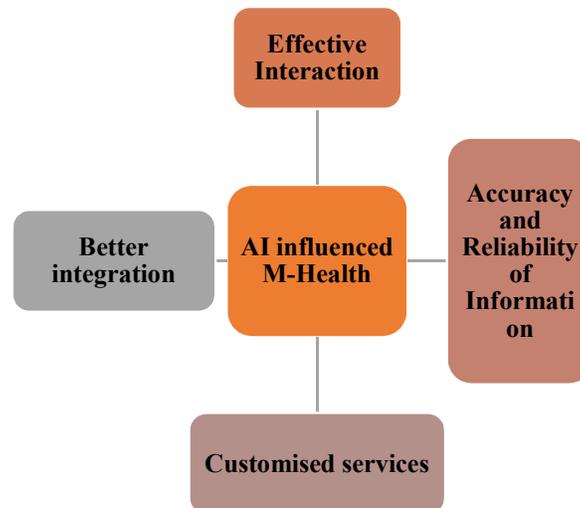


Figure 1: AI Influenced M-Health and impact on health care networking

(Source: Khan [1])

Literature Review

Kavakiotis *et al.* [4] proposed an artificial intelligence-based m-health application to prevent heart failure in patients. Doctors currently use simple methods to generate warnings to detect heart failure. Several false alarms are generated in this method.

In this work, prediction models were proposed to avoid the effects of these false alarms. These prognostic models are based on clinical data collected from 442 patients with heart failure over 44 months. The best prediction model is achieved by combining different alarms based on data observation

and a series of questions using a naive Bayesian classifier.

Lancaster *et al.* [5] described the importance of different mobile components that can be applied to artificial intelligence models to analyze different types of emotions, such as mood, cognition, depression, motivation, different activities, patient environmental behavior, and patients' social behavior. The proposed method contains diagrams for feedback on the process of self-reflection and also provides guidance with the help of various vocational trainers. The proposed method is based on a combination of regression and decision trees, as well as tools based on telephone sensors. The overall accuracy of the proposed method was excellent for predicting 60-91% span. The main disadvantage of his method was that the accuracy of the prediction was much less when it came to emotions such as grief.

Gökalp, *et al.* [6] suggested the use of an automated speech recognition machine in patients with dysarthria. It also helps to produce voicemails. In their method, the authors used hidden Markov models to determine if a verbal word's complete proximity to the speech model was personalized. However, the accuracy of their speech recognition method is only 67% for a real study with nine people.

Alerts have been created and sent to healthcare professionals who can monitor alerts based on predefined instructions. The proposed system was based on information collected from telephone calls from patients. To master the prediction models, services such as linguistics and metalanguage were extracted, as well as the patient's condition [10].

Moreover, pattern recognition algorithms to control virtual extremities in patients with mental pain. A game-based method combined with augmented reality was also used for the healing process. The proposed method was developed in a group of 14 participants. The results showed that approximately 50% of the joint pain symptoms decreased significantly after 6 months of treatment.

Raghupathi [7] proposed a new architecture for healthcare using big data analysis. Its methodology includes various data sources, transformation, big data platform and analysis. The level of the data source focuses mainly on internal and external health data sources, which are found in different places and forms.

The current study is mainly focused in making a creative analysis on the application of AI in enhancing M-Health and its overall impact on health care networking [8]. The researcher is more involved in performing the study based on

explanatory research design, since the implementation of AI in M-Health is a new and innovative way of offering better health care services, it is vital to analyse and apprehend the current situations and create a better framework for future study. The study is mainly focused in gathering critical information from the medical practitioners from leading hospital chains located in India. The researchers have created closed ended questionnaire and the responses are sourced through survey methods using e-mails [9]. The researcher has applied convenience sampling in order to collect the data, nearly 200 questionnaires were received from the respondents and they were used for performing detailed analysis.

Analysis

The analysis tends to apply percentage analysis, regression analysis and chi square analysis.

Based on **Table 1**, it is noted that nearly 77% of the respondents were male and 23% of the respondents were female, 37.5% of the respondents were less than 25 years, 36.5% of the respondents were between 25 – 35 years of experience, 15.5% of the respondents were above 45 years and remaining 10.5% of the respondents were between 35 – 45 years.

56.5% of the respondents were married and 43.5% of them were single, 36% of the respondents were between 1 – 3 years of

experience, 30.5% of the respondents were possessing between 3 – 6 years of experience, 16% of the respondents were possessing more than 15 years of experience, 13% of the respondents and 4.5% of the respondents possessing experience between 9 – 15 years.

Based on **Table 2**, it is noted that 65% of the respondents have stated that AI is being applied in the Mobile health care in the medical centre, this shows that most of the respondents were specifying that there is an increased usage of AI in enhancing the health and wellbeing of the individuals through Mobile and smart devices.

Based on **Table 3**, it is noted that 88.5% of the respondents have stated that there is an integration of AI with health care networking, this enables in collating the information, storing and analysing so that the medical practitioners can provide better services to the patients. Through better health care networking the health of the individuals can be tracked in an efficient manner and in real time.

Regression

This part intends to present the influence of the independent variables like effective interaction, accuracy of information, customised services, better integration with the AI influenced mobile health services.

From **Table 4**, it is noted that the p value of ANOVA analysis is 0.00, which is less than

0.05 hence they are statistically significant, from the coefficients table the regression equation can be stated as

$$Y (\text{AI influenced M-Health}) = \text{Constant} + a \times X1 + b \times X2 + c \times X3 + d \times X4$$

$$Y (\text{AI influenced M-Health}) = 0.426 - 0.081 \times \text{Effective Interaction} + 0.147 \times \text{Accuracy and Reliability of information} + 0.386 \times \text{Customised Services} + 0.441 \times \text{Better Integration}$$

Test of Hypothesis

Chi square test is one of the key non-parametric tests which enables in analysing the differences between the observed and expected results. This part enables in testing the hypothesis of the study based on the literature review stated above

Hypothesis 1

Null: There is no significant association between Effective Interaction and AI influenced M-Health services.

Alternate: There is a significant association between Effective Interaction and AI influenced M-Health services.

From the **Table 5**, it is identified that p value is 0.00, which is less than 0.05 (5% level of significance), hence the null hypothesis is rejected and alternate hypothesis is accepted. [11]. Hence it is concluded that, there is a significant association between Effective Interaction and AI influenced M-Health services.

Hypothesis 2

Null: There is no significant association between Accuracy and Reliability of Information and AI influenced M-Health services.

Alternate: There is a significant association between Accuracy and Reliability of Information and AI influenced M-Health services.

From the **Table 6**, it is identified that p value is 0.00, which is less than 0.05 (5% level of significance), hence the null hypothesis is rejected and alternate hypothesis is accepted. Hence it is concluded that, there is a significant association between Accuracy and Reliability of Information and AI influenced M-Health services.

Hypothesis 3

Null: There is no significant association between Customised services and AI influenced M-Health services.

Alternate: There is a significant association between Customised services and AI influenced M-Health services.

From the **Table 7**, it is identified that p value is 0.00, which is less than 0.05 (5% level of significance), hence the null hypothesis is rejected and alternate hypothesis is accepted. Hence it is concluded that, there is a significant association between Customised services and AI influenced M-Health services.

Hypothesis 4

Null: There is no significant association between better integration of health care networking and AI influenced M-Health services.

Alternate: There is a significant association between better integration of health care networking and AI influenced M-Health services.

From the **Table 8**, it is identified that p value is 0.00, which is less than 0.05 (5% level of significance), hence the null hypothesis is rejected and alternate hypothesis is accepted. Hence it is concluded that, there is a significant association between better integration of health care networking and AI influenced M-Health services.

Table 1: Percentage analysis of Demographic variables

	Data	Frequency	in %
Gender	Male	154	77.00
	Female	46	23.00
Age	Less than 25 years	75	37.50
	25 - 35 years	73	36.50
	35 - 45 years	21	10.50
	Above 45 years	31	15.50
Marital Status	Married	113	56.50
	Single	87	43.50
Work experience	1 - 3 Years	72	36.00
	3 - 6 years	61	30.50
	6 - 9 years	26	13.00
	9 - 15 years	9	4.50
	Above 15 years	32	16.00

Table 2: Application of AI in M-Health in the medical centre

Data	Frequency	in %
Yes	130	65.00
No	70	35.00

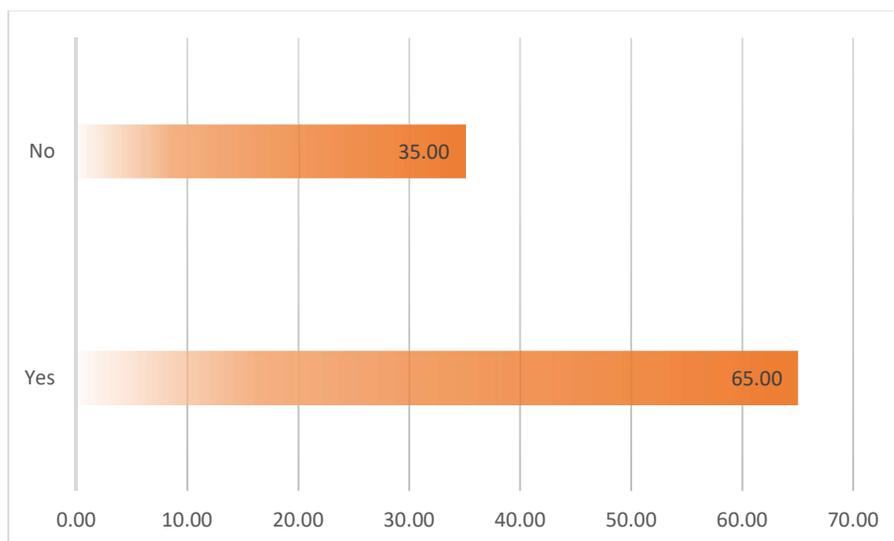


Figure 2: Application of AI in M-Health in the medical centre

Table 3: Integration of AI in Health care networking

Data	Frequency	in %
Yes	177	88.50
No	23	11.50

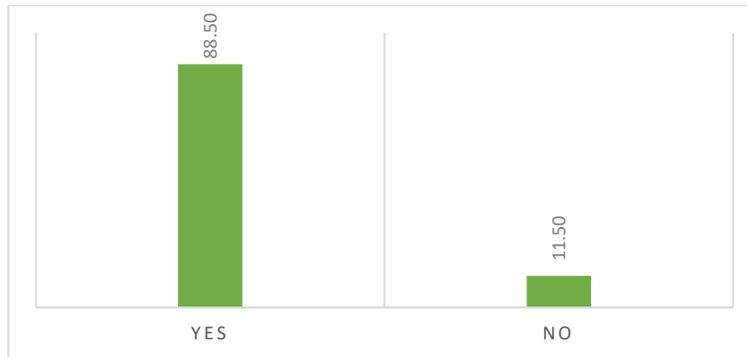


Figure 3: Integration of AI in Health care networking

Table 4: ANOVA and Coefficients

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	171.312	4	42.828	183.620	.000 ^b
	Residual	45.483	195	.233		
	Total	216.795	199			

a. Dependent Variable: AI influenced M-Health services

b. Predictors: (Constant), Better Integration, Effective Interaction, Customised Services, Accuracy and Reliability of Information

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.426	.151		2.811	.005
	Effective Interaction	-.081	.078	-.087	-1.038	.300
	Accuracy and Reliability of Information	.147	.086	.170	1.706	.090
	Customised Services	.386	.090	.388	4.286	.000
	Better Integration	.441	.088	.451	5.029	.000

a. Dependent Variable: AI influenced M-Health services

Table 5: Cross tabulation between Effective Interaction and AI influenced M-Health services

Effective Interaction * AI influenced M-Health services Crosstabulation						
Count		AI influenced M-Health services				Total
		Disagree	Neutral	Agree	Strongly Agree	
Effective Interaction	Strongly Disagree	6	0	0	0	6
	Disagree	18	0	0	0	18
	Neutral	0	15	6	0	21
	Agree	0	6	11	31	48
	Strongly Agree	0	6	36	65	107
Total		24	27	53	96	200

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	273.073 ^a	12	.000
Likelihood Ratio	204.198	12	.000
Linear-by-Linear Association	117.699	1	.000
N of Valid Cases	200		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .72.

Table 6: Cross tabulation between Accuracy and Reliability of Information and AI influenced M-Health services**Accuracy and Reliability of Information * AI influenced M-Health services Crosstabulation**

Count

		AI influenced M-Health services				Total
		Disagree	Neutral	Agree	Strongly Agree	
Accuracy and Reliability of Information	Strongly Disagree	15	0	0	0	15
	Disagree	9	0	0	0	9
	Neutral	0	18	6	0	24
	Agree	0	3	35	22	60
	Strongly Agree	0	6	12	74	92
Total		24	27	53	96	200

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	333.430 ^a	12	.000
Likelihood Ratio	250.889	12	.000
Linear-by-Linear Association	143.097	1	.000
N of Valid Cases	200		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is 1.08.

Table 7: Cross tabulation between Customised services and AI influenced M-Health services**Customised Services * AI influenced M-Health services Crosstabulation**

Count

		AI influenced M-Health services				Total
		Disagree	Neutral	Agree	Strongly Agree	
Customised Services	Disagree	24	0	0	0	24
	Neutral	0	15	0	0	15
	Agree	0	6	11	12	29
	Strongly Agree	0	6	42	84	132
Total		24	27	53	96	200

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	310.209 ^a	9	.000
Likelihood Ratio	220.972	9	.000
Linear-by-Linear Association	138.339	1	.000
N of Valid Cases	200		

a. 7 cells (43.8%) have expected count less than 5. The minimum expected count is 1.80.

Table 8: Cross tabulation between better integration of health care networking and AI influenced M-Health services

Count		AI influenced M-Health services				Total
		Disagree	Neutral	Agree	Strongly Agree	
Better Integration	Strongly Disagree	6	0	0	0	6
	Disagree	18	0	0	0	18
	Neutral	0	21	6	0	27
	Agree	0	6	35	34	75
	Strongly Agree	0	0	12	62	74
Total		24	27	53	96	200

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	338.885 ^a	12	.000
Likelihood Ratio	259.941	12	.000
Linear-by-Linear Association	148.816	1	.000
N of Valid Cases	200		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .72.

DISCUSSION

In order to analyse the overall effectiveness of implementation of AI in M-health care and also to measure impact of health care networking, various aspects are being considered. The indicators are focused in analysing the impact of delivering the services to the patient, also enable in supporting the health care centre, medical doctors and others to address the growing needs of health-related issues in the community [12].

Interaction: The main metric enables in analysing the usefulness of AI towards M-Health so as to achieve the specific goals, support health care centre objectives in delivering better services at lower cost to the patients. There will be a better

interaction between the medical practitioners and patients which enable in understanding the current state of their health and take measures so as to improve them.

Enhanced services: The next aspect to be considered is the effectiveness of the services which are delivered to the patients, before a decade ago the patients need to be present in the health care centre for diagnosis and consult with the practitioners, however with the application of AI influenced M-Health the diagnosis can be made through personal and interactive equipments, these data are then transferred to the centre where the medical practitioners [13].

Accuracy and Reliability: The next critical aspect to be considered is the measure of

analysing the overall accuracy of the data which are collected through the application, these technologies provide a crucial aspect in enabling the user to identify the data in a more effective manner [14].

Integration: The last aspect is the critical integration of various systems and technologies so as to enhance the communication level, support in collecting and analysing the data effectively for the benefit of the patients and deliver better services.

CONCLUSION

The term m-health (M-health) refers to the use of smartphones and other related devices to effectively monitor the health of individuals. Technological advances and the development of medicine have created new and effective ways to monitor human health and provide better care to improve their health and well-being. The development of artificial intelligence (AI) and predictive data analysis has effectively improved the basic healthcare network between patients and physicians. Mobile health services that support artificial intelligence enable analysis of general health, distribution of fitness-based applications on smartphones, collection and storage of medical information and efficient management of healthcare. The concept of mobile health services affected by artificial intelligence is often mentioned,

as M-Health can be considered as a unique app that allows people to use mobile devices such as mobile devices, smartphone apps, etc. Other technologies related to health information improve health care facilities. It is important to note that the user base for smart devices is constantly growing and is expected to reach 3 billion by the end of 2022. This contributes to increasing the number of cheap smart devices and 4G apps worldwide for M-apps. Health. The 5G network also helped support the mHealth app. M-Health helps implement artificial intelligence in analyzing heart problems and other aspects, and doctors use a variety of methods to generate warnings and detect heart failure.

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