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A Survey in Predictive Data Analytics Framework for Child and Pregnant Women Health Care Systems Based on Data Sources

Mahesh Ashok Mahant[1*], Dr. Vidyullatha Pellakuri[2]

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Abstract: Predictive data analytics is essential for enhancing the performance of medical facilities, notably in the field of baby & pregnant women's medical treatment. This survey intends to look into the various data sources utilized in frameworks for predictive data analytics for the healthcare systems for children and pregnant women. The survey begins by describing the value of predictive analytics in enhancing the results of children and pregnancy and then focuses on locating and classifying different data sources that contribute to the predictive analytics framework. It also provides an in-depth review of previous research projects and studies that have used these data sources in predictive analytics models for the health care systems for children and pregnant women. The survey concludes with a discussion of the existing trends and future directions in using various data sources for predictive data analytics in the care of children and pregnant women. To enable the efficient use of these data sources, it highlights the need for standardized data gathering and sharing practices, ethical considerations, and technological improvements in the use of electronic data.

Keywords: Health care system, Sensor, Vital signs, Behavioural healthcare, Telehealth, Children, Pregnant women, Electronic healthcare.

1. Introduction

Predictive data analytics has emerged as a crucial tool in health care, enabling earlier identification, intervention, and personalized treatment options. Predictive analytics has a lot of promise to improve health outcomes and ensure the welfare of vulnerable groups, especially child and pregnant women's healthcare systems [1]. A healthy society depends on maternal and newborn health. Ectopic pregnancy [2, 3], miscarriage, high hypertension which leads to preeclampsia [3, 4], and labor difficulties which may necessitate a cesarean birth (C-section) [5] among the primary issues that influence a mother's health and even end in death.

Furthermore, iron deficiency is a major cause of prenatal or postnatal medical conditions such as antepartum or postpartum hemorrhage [6, 7], retained placenta [8, 9], vaginal infection after birth, with a variety of associated problems. According to the WHO, the majority (94%) of maternal fatalities happen in low- and lower-middle-income countries and 810 women die per day as a consequence of difficulties in delivery and childbirth. However, maternal mortality is decreasing due to current developments in technology. The dangers connected with childbirth in this circumstance may reduced by predicting issues and executing precautionary measures. Consequently, modeling for prediction arose, saving the lives of a billion mothers and newborns [8].

[1]*Department of Computer Science and Engineering Koneru Lakshmaiah Education Foundation Vaddeswaram, AP, India*
[1*]*scholar.maheshashokmahant@gmail.com*
[2]*Department of Computer Science and Engineering Koneru Lakshmaiah Education Foundation Vaddeswaram, AP, India*
2pvidyullatha@kluniversity.in

Planned hospital admissions and doctor visits had to be canceled due to the lack of a treatment plan and information on the disease's long-term effects. Pregnant women have been put in a challenging circumstance due to the tight scheduling of scheduled meetings with an obstetrician or midwife throughout their pregnancies [9]. The American College of Obstetricians and Gynaecologists (ACOG) recommended arranging specific sessions via "telehealth" to reduce the possibility of becoming ill when driving to the clinic or interacting with healthcare providers [10]. This term describes the delivery of remote medical treatments by healthcare experts who communicate with sufferers through technologies to offer medical care & notify them on health conditions [11]. The majority of times, appointments are performed by video chat, however, if a camera is not available, they can also be conducted over the phone. Furthermore, portable tools such as sphygmomanometers, glucometers, pulse oximeters, & mobile CTG monitors utilized for monitoring the health of patients [12]. Futterman et al. reported those telemedicine prenatal sessions had slightly lower satisfaction scores than in-person consultations, but there were no clinically relevant variances in the outcomes [13].

The core of the present system is the development of models for forecasting utilizing ML methods. Approaches like classification, regression, clustering, or time series analysis are utilized with procedures such as decision trees, RF, SVM, gradient boosting, or deep learning approaches such as neural networks. These models are accurate and generalizable since they are trained and verified using the proper data splits and assessment measures [14]. DL-based algorithms have employed images, health

information, as well as time series information for a variety of healthcare uses, involving sickness forecasting. These algorithms discover hidden patterns in health information, allowing for quicker and more accurate diagnosis for patients [15]. With the exact analysis of various pathogens provided by deep learning, clinicians can treat patients more effectively. Consequently, wiser medical choices are made. Additionally, deep learning is employed to assist professionals provide care for patients [16]. DL algorithms improve medical data evaluation, including diagnosis [17], with precision. Deep neural networks have numerous medical uses [18], involving imaging in medicine, medical information analytics, maternal medical services, medication research [19], genomes research [20], and numerous others.

The relevance of big data, as well as its use for medicine along with the medical sciences, has grown with the emergence of the age of social media (platforms such as Facebook and Twitter) with applications for smartphones that may track individual health indicators utilizing sensors or analyzers [21, 22]. The objective of data mining is to improve the past collection of customer data in order to provide more effective medical care. This paper [23] discusses the advantages & ways to utilize big data in medical facilities. It focuses on the massive volumes of data generated by these networks, in addition to their properties, possible hazards associated with the processing of information, and the way how analytics offer useful insight into huge data sets [24]. The traditional research project intends to fill these gaps by looking for a standardized design and implementation process for RAI-based solutions for individualized maternity care. We require achieving two main aims by using affective computation to identify emotional suffering (in accordance with the biopsychosocial diagnostic paradigm): 1), lower the risks related to being pregnant, and 2) enhance the pregnant woman's experience during the procedure [25].

In this survey, the infant and pregnant women's health care system is briefly clarified by employing multiple sources of data including vital signs along with evaluations, telehealth data, behavioral data, and electronic medical records, while it identifies which source of data is most effective and possesses less constraints via extensive literature analysis. By the end of the review, readers will have a complete understanding of the various kinds of newborns along with pregnancy medical care systems, as they will be able to apply this information to improve their careers.

2. Literature Survey

2.1 Health Care System Using Vital Signs And Measurement:

Dese.et.al, [26] to fulfill this desire, the creator conceived & built an inexpensive, compact hardware gadget to track pregnant women's health conditions. Monitoring of maternal vital signs by this gadget would be a tremendous advantage, particularly for individuals living in low-resource environments. However, the proposed device is larger than the smart bands in size and a mobile network is necessary for the GSM system to function. While the Sunrom BP sensor can identify blood pressure without a cuff, it requires careful positioning due to its high sensitivity.

Li.et.al, [27] this paper proposes a cloud-based & connected IoT platform for innovative maternity medical services. It also looks at how it may used, monitored, and managed in hospitals' home obstetrics units. The Smart Maternal platform may reduce the burden on medical professionals, increase productivity, make it simpler for pregnant people to interact with physicians, and enhance the quality of obstetrical treatment. However, the problems include the difficulty of integrating wearable technology with electronic medical records, the size and setup complexity of current devices, their short battery lives, the low data collecting accuracy, and privacy concerns.

Dhivya. et.al, [28] The author uses a board with an ATmega328P-based microprocessor called the Arduino Uno R3. The ATmega328 microcontroller is used as a communication interface with the sensors, including blood glucose, temperature, and pulse sensors for the mother and child. The microcontroller collects information collected from multiple sensors, communicates sensor-specific information value to the association through Wi-Fi, and then delivers the information to the healthcare group dietician, and guardian, allowing them to track the health services limits from any distant location. The LCD and the regulator work together to alert the patient or the caregiver to any unusual situations. The customer finds the framework to be simple.

Green.et.al, [29] this research proposes calculating the usual values for mothers' health indicators while pregnancy, which are not currently studied in a large current population. From August 2012 to September 2017, the researchers performed a prospective, longitudinal cohort work across three centers in the UK. It enrolled women with pregnancies that were precisely timed, singletons, and fewer than 20 weeks gestational age. By offering gestation-specific ranges of reference for recognizing abnormal blood pressure, heartbeat, respiration rate, oxygen saturation, and temperature during pregnancy, the outcomes contradicted the presence of a clinically important drop in blood pressure from 12 weeks of gestation.

Joshi.et.al, [30] the goal of this investigation was to look at how patients engage with wearable devices with sensors to undertake continuous surveillance in an acute hospital setting. As a component of the wearable sensor research,

sufferers were required to fill out a 9-item questionnaire. Semi-structured conversations with a subgroup of surgical patients who wore a Sensium Vital Sign Sensor were done. Patients who used wearable sensors had overwhelmingly good feedback, with limited concerns mentioned. Wearable sensors, according to patients, will boost their sense of security, reduce stress on physicians, and serve as a beneficial component of upcoming medical equipment. However, this research only included patients who volunteered to wear a Sensium wearable sensor for two days on average. Additional sensors might not be compatible with technology for sensors and continuous monitoring concepts.

Xu.et.al, [31] The author proposed that modern wireless and bio-integrated sensors offer possibilities to improve monitoring performance, lessen iatrogenic injuries, and advance family-centered treatment. Initial validation findings have shown that the performance is comparable to (and sometimes exceeds) procedures for evaluating the standard of care for preterm neonates in nations with high incomes. Upcoming monitoring expenses might be far cheaper than present approaches due to the reusable character of these sensors along with their communication with affordable smartphones. Neonatal outcomes might significantly improve with widespread deployment in low-income nations.

Rhayem.et.al, [32] the goal of this project is to supply a semantic-based context-aware platform (IoT Medicare system) for observing patients using medical connected objects (MCOs). This system is built around a core domain ontology (HealthIoT-O), which is intended to capture the semantics of disparate MCOs & their information. SWRL rules are employed to validate the appropriate operation of MCOs and the processing of medical information for both diagnosis and therapy. To assess the efficiency of the established IoT Medicare structure, a case investigation into gestational diabetes illness management is suggested. An assessment step is offered, with emphasis on the quality of expanded semantic models and the efficacy of system.

El-Sappagh.et.al, [33] the objective of this work is to create a comprehensive MH platform with incorporated CDSS abilities for tracking and controlling type 1 diabetes. The effectiveness of a particular CDSS is defined primarily by the standard of its expertise as well as its semantic compatibility with dissimilar sources of information. This effort involves constructing a semantic CDSS depending on the suggested FASTO ontology for that reason. The resultant CDSS system can assist physicians effectively and accurately monitoring more patients, as well as patients in remote locations in managing their diabetes and crises.

Kumar.et.al, [34] this study presents a smart cradle that swings automatically when a newborn screams. It also contains an autonomous rotating toy to keep a newborn entertained throughout the day. Node is a microcontroller building block that receives information from sensors & delivers it via Wi-Fi to the Adafruit MQTT server. Environmental factors such as temperature, humidity, and weeping are detected via sensors. A cradle prototype was made out of red Meranti wood and an external web camera. The network is being rigorously evaluated to ensure that it functions effectively and securely.

Veena.et.al, [35] suggested remote pregnancy risk monitoring (RPRM) technology is a non-invasive, live platform that uses a grouping of wireless sensors & the internet to assess the dangerous condition of such pregnant women. It offers healthcare services that pregnant women may use from the comfort of their own homes and connects them to their healthcare professionals. Furthermore, the suggested system has an excellent data visualization mechanism that allows healthcare providers to examine and monitor the state of their patients remotely, bypassing distance obstacles.

S. NO	AUTHOR	TECHNIQUE	SIGNIFICANCE	LIMITATION/ FUTURE SCOPE
26	Dese.et. al	Lvital device	A low-cost, portable device is being developed to monitor the vital signs of pregnant women in locations with inadequate resources.	In the future, we recommend adding an interface to accept telephone numbers from every client using a keypad, making it quicker to use for consumers.
27	Li.et.al	Perception Layer, Network Layer, and Application Layer	This abstract highlights the rapid progress of wearable pregnancy devices and offers an IoT architecture for smart	Upcoming studies will examine the transferability of the underlying technology to more scenarios and hospitals

			maternal healthcare providers that combine mobile devices and cloud computing.	by comparing it to other comparable systems.
28	Dhivya. et.al	ATmega328 microcontroller	An IoT-based maternal healthcare system monitors the health of pregnant women in rural India with an Arduino Uno R3 microcontroller board.	In the future, the device's capability may be increased by adding modules, utilizing external components, or choosing more sophisticated microcontrollers with improved features and capabilities.
29	Green.et.al	Three-center, prospective, longitudinal cohort study	To identify typical values for maternal health indicators during pregnancy that cannot be identified in a large modern population.	In the future, it needs to be supported by validation studies, interaction among healthcare providers and researchers, and ongoing updates to guarantee dependability, accuracy, and clinical relevance, ultimately leading to better pregnancy outcomes.
30	Joshi.et.al	Senasium Vital Sign Sensor and Likert scale	The goal of this investigation is to look at how patients respond to wearable sensor technologies and to conduct ongoing monitoring in an acute hospital environment using questionnaires and interview investigations.	In the future, it will be necessary to comprehend the opinions of sufferers' friends and relatives on wearable sensors, particularly when they are used at home for extended periods and notifying family members.
31	Xu.et.al	Wireless, and bio-integrated sensors	Wireless sensors can be used to improve neonatal physiological monitoring, decrease iatrogenic wounds, and promote family-centric care, with the potential for deployment in low-	Monitoring labor and pregnancy to advance understanding of the physiological determinants of preterm delivery is one of the future potentials.

			income countries.	
32	Rhayem .et.al	Semantic-based context-aware system (IoT Medicare system)	The IoT Medicare system presents HealthIoT-O to define heterogeneous MCOs and their data and presents a semantic-based context-aware solution.	In the future, the author will expand and enhance our technique by implementing a real-world use case, collecting clinical data from electronic sources, assessing the capability of our approach, offering an intelligent strategy to optimize ontology instances, and assessing the scalability of the IoT-Medicare system.
33	El-Sappagh .et.al	clinical decision support systems (CDSS) Framework based on FASTO ontology	This work proposes a system that consumes the cloud for tracking and regulating type 1 diabetes that depends on the suggested FASTO ontology.	In future years, FASTO and ontology will both utilized to develop a mobile medical application for T1D surveillance, which will developed

				to handle hypoglycemia and hyperglycemia scenarios.
34	Kumar. et.al	ATmega32 microcontroller, CP-ABE algorithm	The primary goal of this work is to create a smart cradle that allows for video surveillance of newborns and improved newborn care when parents are not there.	Future advancements should concentrate on data encryption, user authentication, and safe data transfer methods. Machine learning algorithms may be used to assess data and make meaningful recommendations for improving sleep patterns and dealing with sleep-related difficulties.
35	Veena.et.al	Remote Pregnancy Risk Monitoring System (RPRM).	The suggested remote pregnancy risk monitoring (RPRM) method's major goal is to tackle the problem of maternal death rates that arise from	In the future, the suggested solution may be improved to analyze data using ML algorithms, offer new methods to visualize data and employ GPS

			numerous causes including lack of awareness, delays, lack of information, poverty, a lack of competent medical personnel, & inadequate healthcare facilities.	sensors to monitor numerous patients in a certain region.

According to this survey, vital signs and measures are crucial to the treatment of both pregnant women and young children because they allow for the early diagnosis of problems, the evaluation of general health, and the tracking of progress. However, they may not fully reflect the person's health situation and might be intrusive and uncomfortable. For appropriate diagnoses and judgments, healthcare providers must take trends, patterns throughout time, and other clinical considerations into account. Healthcare professionals must use a thorough, individualized approach, taking into account vital signs along with other clinical assessments, to offer the best possible treatment.

2.2 Health Care System Using Behavioural Data:

Abamecha.et.al [36] The goal of the investigation focused on looking at the psychological factors associated with the willingness to use cervical cancer screening among women accessing maternity & pediatric medical services in Southern Ethiopia in 2017. A standardized questionnaire administered by an interviewer was utilized to collect data. Every aspect of the theory of planned behavior (TPB) was studied to assess intention, attitude, perceived social pressure, as well as perceived capacity to alter situations in relation to cervical cancer screening. The information was examined utilizing the statistical program for Social Sciences version 21.0. A significant relationship was determined as one with a P-value less than 5%. Interventions for health behavior change must concentrate on improving knowledge and empowering women to reconsider their authority ideas while developing capacity in the face of cultural norms and conditions that compete with the use of cervical cancer detection services.

Nankya-Mutyoba.et.al [37] The goal of this research was to investigate attitudes and preventive behavioral intentions towards hepatitis B virus (HBV) and liver cancer in an obstetric community in an extremely high HBV prevalence SSA context that did not provide prenatal HBV care. Within October 2016 & December 2017, pregnant women with informed permission were sought out from public medical centers in Uganda's central & northern parts. Conventional methods and techniques founded on the medical belief framework & theory of planned behavior were utilized to gather data on socio-demographic factors, HBV perceptions, and behavioral intentions. To evaluate the distribution of respondents depending on their estimated danger of HBV and liver cancer for themselves, their child below the age of five, and their partner, a descriptive analysis was done employing Chi-square testing. To assess the associations between perceptual characteristics and other behavioral outcomes, modified Poisson regression models were utilized. These findings might help guide HBV programs focused on increasing people's willingness to seek HBV preventive services and encouraging HBV micro-elimination.

Lahdepuro.et.al, [38] The goal of this research project was to see if positive maternal psychological status while pregnant is connected with a minor incidence of psychological and behavioral issues in kids and if it reduces the detrimental impacts of poor maternal mental health. Mothers in the Prediction and Prevention of Preeclampsia and Intrauterine Growth Restriction research to assess good mental wellness used the Positive and Negative Impact Schedule, the Spielberger State Anxiety Inventory Curiosity scale, and a visual analog scale for support from others, and the Institute for Epidemiologic Studies Depression Scale was used to assess negative mental health. The findings showed that children with mothers who improved their psychological circumstances while pregnant were less likely to have mental and behavioral disorders, while children whose mothers experienced mental health concerns before to or during pregnancy also benefited.

Wahi.et.al, [39] the impact of maternal health behaviors & socioeconomic variables on nutrition in kids was explored in this research. The data came from the Indigenous Birth Cohort (ABC) study, a prospective birth cohort created in conjunction with an Indigenous community-based Birthing Centre in southwestern Ontario, Canada. There were 110 mother-infant dyads reported among 2012 and 2017. Multiple linear regression analyses were achieved in order to clarify the components related with one-year infant diet scores, with greater scores indicating an improved diet. This research emphasizes the favourable influence of Indigenous midwives in health care delivery and demonstrates that increased mother socioeconomic advantage has an excellent effect on child nutrition.

Girchenko.et.al, [40] Using multivariate supervised analytical techniques, the writer revealed a maternal early-

pregnancy BMI-associated metabolomic component throughout pregnancy. We afterward investigated whether this component was connected with mental along with behavioral impairments in kids, if it developed the forecasting of kid consequences over maternal BMI, and how much of the impact of maternal BMI on kid results this element mediated. This metabolomic component was suggestively connected to an advanced likelihood of any mental & behavioral disease in children, as well as a higher relative risk for developing a greater amount of co-morbid illnesses. It developed the goodness-of-fit over maternal BMI by 37.7-65.6 percent and moderated the impact of maternal BMI on the child's results by 60.8-75.8 percent. These findings might lead to the identification of meta-bolomic targets for tailored therapies.

Khan.et.al, [41] The purpose of this investigation is to look at the trends along with predictors of under-5 mortality (U5M) in Bangladesh, in addition to the consequences of dangerous reproductive behaviors among mothers along with medical care utilization. Data from seven waves of the Bangladesh Demographic and Health Survey (1994-2014) were examined for trends and projections of U5M, and a Chi-square (2) testing was utilized to determine whether there had been a relationship among maternal high-risk fertility behaviors as well as utilization of medical facilities. The influence of reproductive practices and healthcare utilization on the incidence of U5M was investigated using a multivariate logistic regression model. The Sustainable Development Goals ask for a U5M rate of 25 per 1000 live births by 2030. Based on the results of this research, mother high-risk fertility behaviors & non-use of maternity medical services are fairly widespread in several parts of Bangladesh, that has raised the incidence of U5M in those places. Policies and programs to minimize the pregnancy rates of at-risk women and encourage increased utilization of maternal healthcare services are required.

Xu, Tingting.et.al, [42] The author predicted that maternal impaired glucose tolerance was linked to early and mid-childhood cognitive and behavioral outcomes in kids. We investigated the associations among mother-impaired glucose tolerance at 26-28 weeks of pregnancy & offspring cognitive and behavioral scores in 1,421 kids from the Project Viva pre-birth cohort. To examine child cognition, the Kaufman Brief Intelligence Test, Wide Range Assessment of Memory and Learning, and Wide Range Assessment of Visual Motor Abilities (WRAVMA) were employed. The writer additionally studied parent and teacher-rated behavioral results using Strengths and Difficulties Survey and the Behavioural Rating Inventory of Executive Function. The author found no indication that maternal impaired glucose tolerance was linked to mid-childhood cognitive or behavioral development.

Khatibi.et.al, [43] This study looked at how well pregnant women slept and the impact of cognitive behavioral therapy. A parallel randomized controlled trial was conducted at Zanjan's multifunctional healthcare providers in 2019. Convenience sampling was performed on 56 eligible women who were singleton primiparous and had a sleep quality score of at least 5. There were two groups of participants—28 in each—designated as intervention and control. The test for generalized estimating equations was used for data analysis. The intervention group's scores on sadness and stress improved over time about the control group's scores, while the intervention group's scores on sleep quality and its subscales, except the usage of sleep medicines, were considerably lower. However, there was little improvement in the anxiety score.

Tuovinen. et.al, [44] The purpose of this investigation was to see if maternal antenatal signs such as anxiety, depressive disorder, as well as perceived stress, had been associated with psychological and behavioral conditions in their offspring, if the relationships differed by gestational week. The kind of stress, whether these signs were consistently excessive or fluctuating, as well as if they were impacted by either the mother's or the father's long-term mood or anxiety-related issues. As part of the PREDO study, 3365 women performed the Centre for Epidemiologic Studies Depression Scale, the State Anxiety Inventory, and the Perceived Stress Scale up to 14 times throughout pregnancy. The purpose of this investigation was to see if maternal antenatal signs such as anxiety, depressive disorder, as well as perceived stress, had been associated with psychological and behavioral conditions in their offspring, if the relationships differed by gestational week. The kind of stress, whether these signs were constantly excessive or fluctuating, as well as if they were impacted by either the mother's or the father's long-term mood or anxiety-related issues. As part of the PREDO study, 3365 women performed the Centre for Epidemiologic Studies Depression Scale, the State Anxiety Inventory, and the Perceived Stress Scale up to 14 times throughout pregnancy.

Yilmaz.et.al, [45] Anorexia nervosa (AN), obsessive-compulsive disorder (OCD), along with AN/OCD Trans-diagnostic polygenic scores (PGS) was tested in an extensive developmental cohort to see if they predicted eating disorder, OCD, and signs of anxiety. It used summary statistics from Psychiatric Genomics Consortium AN and OCD genome-wide association studies to perform AN/OCD trans-diagnostic genome-wide association meta-analysis and determine AN, OCD, and AN/OCD PGS in individuals from the Avon Longitudinal Study of Parents and Children to forecast eating disorder, OCD, and anxiety symptoms, divided by sex. Excessive activity might have a trans-diagnostic genetic basis, but signs of anxiety can be linked to AN genetic predisposition. Our findings also imply that some of the genetic risk factor may be gender-specific.

Wilson. et.al, [46] the study was carried out in Hackney, London, UK, to look into the experiences of 10 medical professionals and 47 pregnant and currently pregnant women. The research's major subjects were the National Health Service during pregnancy and women's impressions of maternal immunization. Deductive analysis of the research was conducted utilizing anthropological texts, while inductive analysis was conducted using a theme method. The results were categorized into five themes: maternal immunization access, rhetoric in healthcare institutions, community and family impacts on decisions, opinions of healthcare professionals, and the impact of patient-healthcare professional interactions. With the proposals, the healthcare system would be made more accessible and democratic while also improving maternal vaccine uptake.

Kalok.et.al, [47] The research found that 8.0% of expecting mothers were vaccine-hesitant, with race, faith, the quantity of children, level of schooling, & job position all playing a role. The biggest risk factor was low education, followed by religion. The primary source of information regarding immunization was health professionals. Vaccine hesitation was mostly caused by concerns about negative side effects, immunization pain, a preference for alternative care, and mistrust of the pharmaceutical sector. Pregnant moms' hesitation to receive a vaccination was also strongly related to their partners' ethnicity, poor educational attainment, and low income. Muslim women have a low likelihood than other mothers to be vaccine-averse, with vaccination reluctance being quite uncommon among pregnant women in metropolitan Malaysia.

S. NO	AUTHOR	TECHNIQUE	SIGNIFICANCE	LIMITATION/ FUTURE SCOPE
36	Abamecha.et.al	Theory of planned behavior (TPB) and Multiple linear regression models	The psychological aspects linked with the willingness to use cervical cancer screening among women accessing maternity & child health services in Southern Ethiopia in 2017 were explored in this research. Interventions should focus on raising awareness, enabling women to review control beliefs, and addressing societal norms.	More studies ought to be conducted utilizing a longitudinal design to assess the translation of behavioral intention to actual behavior, indicating a cause-effect link..
37	Nankya-Mutyoba.et.al	Chi-square tests, Modified Poisson regression analyses	The study aimed to assess attitudes and preventative behavioral intentions about HBV and liver cancer in an obstetric community without prenatal HBV care.	Future studies could concentrate on creating and assessing targeted awareness- and education-raising campaigns to improve pregnant women's knowledge of HBV in Uganda, comprehending attitudes and stigma, integrating HBV services into antenatal care, and looking into the facilitators and barriers to testing and vaccination.

38	Lahdepuro.et.al	Positive and Negative Affect Schedule (PANAS), Spielberger State-Trait Anxiety Inventory (STAI), and Prediction and Prevention of Preeclampsia and Intrauterine Growth Restriction (PREDO) studies	The research sought to examine if positive maternal mental health while pregnant is connected with a lower incidence of mental and behavioral issues in kids, as well as whether it mitigates the detrimental impacts of negative maternal mental health.	Future studies should look at socioeconomic issues, cultural and contextual concerns, implementation science, and the scalability of treatments regarding the impact on fathers' mental health during pregnancy. These elements will assist in guiding parent-involved initiatives that support children's mental health.
39	Wahi.et.al	Multiple linear regression analyses	The objective is to examine how mother health sociodemographic characteristics (such as socioeconomic status and education), health behaviors (such as diet), and conventional healthcare utilization during pregnancy influence newborn nutrition at one year of age.	Future studies should concentrate on creating and implementing culturally relevant treatments that target the distinct health behaviors and social factors influencing newborn nutrition in Indigenous communities.
40	Girchenko.et.al	Multivariate supervised analytical methods	The research's primary objective is to look into the link between maternal early-pregnancy BMI-related metabolomics disruptions and mental & behavioral impairments in offspring, in addition to finding metabolomic targets for personalized therapy.	Longitudinal & mechanistic investigations will be necessary in the future in order for understanding the long-term influence of maternal early-pregnancy BMI-associated metabolomic elements on offspring mental and behavioral conditions.
41	Khan.et.al	U5M and a Chi-square ($\chi 2$) test, multivariate logistic regression model.	This investigation looks at trends & estimates for under-5 mortality (U5M) in Bangladesh, as well as the consequences of high-risk reproductive behaviors among mothers and their use of medical systems.	Poor use of healthcare services and maternal high-risk reproductive behaviors are significant predictors of U5M and can impede progress toward SDG 3.2. Thus in the future, women who are more prone to engage in these behaviors

				and underutilize healthcare services should be given priority in region-specific programs.
42	Xu, Tingting .et.al	Kaufman Brief Intelligence Test, Wide Range Assessment of Memory and Learning, and the Wide Range Assessment of Visual Motor Abilities (WRAVMA), linear regression models	The main objective is to predict that maternal impaired glucose tolerance is linked to early and mid-childhood cognitive and behavioral outcomes in children.	Future studies should look at the links between maternal glucose intolerance and behavioral and cognitive difficulties in middle childhood.
43	Khatibi. et.al	Randomized controlled trial, Convenience sampling	The aim of this research was to see how cognitive behavioral therapy influenced pregnant women's sleep quality.	In the future, cognitive-behavioral counseling interventions for bettering sleep quality also include personalized interventions, technology integration, virtual counseling and telehealth, collaboration with prenatal care providers, mindfulness-based techniques, multifaceted methods, and cost-effectiveness analysis.
44	Tuovinen.et.al	Prediction and Prevention of Preeclampsia and Intrauterine Growth Restriction (PREDO) study,	The primary goal of this research is to look at the relationship among mother's prenatal stress and mental and behavioral issues in their kids. It aims to provide insights into the importance of minimizing maternal prenatal stress to promote child mental health.	Future research can help to design policies to encourage maternal mental health throughout pregnancy and improve support networks for pregnant women who are under stress.
45	Yilmaz. et.al	AN/OCD trans diagnostic genome-wide association meta-	The study aims to investigate genetic risk factors associated with anorexia nervosa, obsessive-	Future studies can concentrate on improving the accuracy and predictive potential of

		analysis.	compulsive disorder, and AN/OCD transdiagnostic polygenic scores (PGS) and In a large developing cohort, see whether they are able to forecast problems with eating, OCD, and anxiety symptoms.	AN/OCD trans-diagnostic polygenic scores. Transdiagnostic methods can be created to avoid, early identify, and treat the signs of AN, OCD, and anxiety.
46	Wilson. et.al	Maximum variation sampling method and thematic analysis approach	To develop a contextualized knowledge of the variables influencing vaccine acceptability during pregnancy in Hackney, a borough in northeast London, the UK, a qualitative study was carried out. This report offers suggestions for raising long-term mother vaccine acceptability based on in-depth insights learned from the aforementioned study.	Targeting pregnant women and their families with thorough educational programs that include evidence-based information on vaccine safety, effectiveness, and advantages for both mother and child helps raise awareness of maternal vaccination.
47	Kalok.et.al	Cross-sectional study	The goal of this investigation was to utilize the PACV to determine the prevalence of vaccination apprehension among urban pregnant women and its relationship to maternal and paternal sociodemographic characteristics.	Future research on vaccination reluctance in nulliparous women will thus necessitate PACV score modification.

According to this survey, pregnant women's healthcare using behavioral data has benefits including individualized treatment, early risk identification, and customized therapies. It enables healthcare professionals to examine data to find trends and early warning signals, enabling prompt treatments and better health outcomes. However, since sharing personal information may create privacy concerns, it raises questions regarding ethics and privacy. To retain confidentiality, healthcare practitioners must ensure informed consent, safeguard data security, and adhere to ethical standards. Large amounts of behavioral data might provide complicated analyses and interpretations. Providers must be careful not to reinforce or maintain these differences while promoting equitable treatment since it may reflect preexisting prejudices and inequities in healthcare. Finally, weighing the advantages of behavioral data with patient care Providers must be careful not to reinforce or maintain these differences while promoting equitable treatment since it may reflect preexisting prejudices and inequities in healthcare. In conclusion, it is critical for efficient healthcare to strike a balance between the advantages of behavioral data and patient privacy, data accuracy, and equal treatment for all pregnant women.

2.3 Health Care System Using Electronic Health Records:

Zhang.et.al, [48] the writer of this article provides an ML approach to forecasting postpartum depression risk

depends on data from EHRs. As development and validation sets, two EHR datasets including information on 53,972 women from several locations from 2004 to 2017 and 15,197 women from a single site from 2015 to 2018 were used. The main result was a PPD diagnosis within a year of delivery. To ensure the accuracy of the model & future point-of-care risk forecasting, an architecture comprised of data extraction, manufacturing, and ML was developed to select a minimal set of attributes from EHR datasets. PPD was represented by a treatment prevalence in the study data, which is probably lower than the sickness prevalence. Early detection of pregnant women at risk for PPD using EHRs and machine learning may enable scalable and prompt prevention and management, minimizing adverse effects and the burden that goes along with them.

Ellis.et.al, [49] In order to clarify the biological makeup of opioid-dependent individuals, the writer evaluated evidence gathered from EHR, containing lab test outcomes, vital signs, treatments, prescriptions, and additional data gathered from millions of the sick. We constructed an ML framework to categorize patients based on their chance of acquiring a diagnosis of substance dependence utilizing EHR data from patients who were identified with drug dependence in addition to control patients who had no previous record of illnesses related to drugs. With a mean area under the receiver operating characteristic (AUROC) curve of 92%, a model assessment of top ML classifier found links between core clinical traits with drug dependency. Diagnoses, prescriptions, and treatments conducted prior to substance dependence diagnoses were studied in order to clarify the medical history of individuals with drug dependency compared to controls. The predictive algorithm might be beneficial for recognizing individuals who are at chance of getting addicted to narcotics, are at danger of overdosing, and are seeking opioids but have additional signs when they visit the emergency room.

AlSaad.et.al, [50] This work presents a clinical prediction model (PredictPTB) that accurately predicts the chance of preterm birth at 1, 3, and 6 months earlier delivery using features (medical codes) easily accessible through EHR. To simulate the longitudinal patient EHR visits, PredictPTB's architecture employs RNNs. PredictPTB employs a single code-level attention system to expand the accuracy of predictions while also offering temporal code-level and visit-level justifications for forecast outcomes. We assess the efficiency of multiple information modalities, and data windows, along with the time frames for forecasting points, along with providing an example of our algorithm's interpretability to demonstrate how clinicians could obtain insight into the forecasts.

Abraham. et.al, [51] The author uses machine learning to forecast singleton preterm birth using a variety of data from EHRs with 35,282 births. We discovered that ML techniques trained only on billing codes beat equivalent models developed using known risk variables in their ability to predict the probability of preterm delivery at various gestational ages. The software stratifies births into understandable groupings, containing high-risk preterm birth subgroups enriched for certain comorbidities, according to the patterns it has learnt. The proposed machine learning technique also forecasts delivery mode, recurrent preterm birth, and preterm birth subtypes (spontaneous vs. suggested). Finally, it shows that the prediction models continue to be accurate on a sizable, independent cohort (5978 deliveries) from a dissimilar hospital system, demonstrating the portability of our technique.

Li.et.al, [52] The author employed the electronic health records (EHR) that were gathered at the beginning of the second trimester in this research ML algorithms to forecast pre-eclampsia (PE) risk in women. The study comprised a total of 3759 pregnancies that received prenatal care at the Shanghai Jiaotong University-affiliated Xinhua Hospital's Chongming branch. Logistic regression (LR), RF, SVM, and extreme gradient boosting (XGBoost) were utilized to build the forecast model. The accuracy, precision, recall, false negative score, f1_score, brier score, and area under the receiver operating curve (AUC) of ML models were utilized to assess their efficacy. The risk of PE development may forecasted with high discriminative ability consuming ML techniques depends on EHR data obtained at the start of the second trimester. Further investigation will be required to evaluate the model's clinical utility in real-world settings.

Oliver-Roig.et.al, [53] this study used posthoc Explainable Artificial Intelligence (XAI) methodologies and ML models to forecast exclusive breastfeeding throughout the in-hospital postpartum stay. We employed 10-fold stratified cross-validation to assess ML models using measures including accuracy, Brier score, the area under curve precision-recall, and area under curve receiver operating characteristic (ROC AUC). After choosing the best-fitting approach, we estimated Shapley's additive values to assign a weight to every forecast dependent on the amount that it contributed additively to the result and also in order to understand the forecasts. The ML approach accurately foretold exclusive breastfeeding throughout the hospital stay, suggesting opportunities for enhancing care for particular mother groups, according to current and past encounters with infant feeding, medical circumstances of the babies, and support circumstances of the participating hospitals. By locating non-linearity linkages and effect heterogeneity, XAI approaches were able to explain risk variances in certain circumstances.

Gao.et.al, [54] the effectiveness of DL frameworks that incorporate into account temporal correlations shown in EHRs to predict extreme preterm birth (EPB) was

investigated by the writer. On EHR data, word embedding and a temporal DL model based on RNNs were used. Utilizing 10 years of EHR data from 25,689 births at Vanderbilt University Medical Centre, the researcher compared the performance of RNN ensemble algorithms to that of standard ML algorithms. A corrected odds ratio was used to find risk variables related to EPB. Up to 8 weeks before it occurs, EPB may be predicted using temporal deep learning. Healthcare organizations may be able to spend resources wisely and guarantee that patients receive the right care if EPB is accurately predicted.

Manemann.et.al, [55] The researcher might be able to find novel risk variables for complicated conditions by combining the amount and breadth of clinical data present in EHR systems with cutting-edge ML algorithms. As a result, extensive harmonized and processed EHR data were used to create huge electronic population-based cohorts. Participants were those who were at least 30 years old and lived in Olmsted County, Minnesota, on January 1, 2006. A thorough risk profile for each patient was created by developing and validating algorithms to characterize several patient variables. On January 1, 2013, all people aged 30 and up who resided in the predominantly rural 26-county area of southern Minnesota and western Wisconsin were selected to form an independent validation cohort. These electronic cohorts will be utilized to find unique sex-specific risk factors for complex illnesses using cutting-edge ML methods. With the help of these strategies, we will be able to deal with several EHR-related issues.

Debray.et.al, [56] The TRIPOD-Cluster statement, made up of a 19-item checklist, aims to improve the reporting of research projects that use clustered data to create or verify multivariable models for forecasting, including personal participant information meta-analyses and EHRs. This explanation and extension article illustrates the reasoning, specifies the meaning of every point, along with highlights the relevance of transparent reporting when assessing bias risk and the clinical usefulness of the model for forecasting. The TRIPOD-Cluster statement's checklists elements detailed & accompanied by released instances of good reporting. The study also serves as a reference for factors to consider when planning, conducting, and assessing research for the design or validation of forecasting algorithms with clustered data. It is recommended that writers include a finished checklist with their submission to help with the editing process, peer reviewers, and finally, readers and the reviewers of forecasting models studies.

Ren.et.al, [57] ML techniques were utilized in this work to forecast the requirement for blood transfusions following cesarean sections, analyze cesarean section results, and identify risk variables for hypothermia during anesthesia recovery. Intraspinal anesthesia was the preferred technique of cesarean delivery; general anesthetic was only utilized in cases of extreme patient demand, social stigma, or failure of intraspinal anesthesia. The intraoperative blood transfusion forecasting framework was created utilizing ML approaches including ANN3, XGB, and logistic regression. Accuracy, recall rate, F1 value, and area under the ROC curve (AUROC) were all calculated and analyzed. The incidence of hypothermia, as well as the relevant clinical parameters, were determined. Variables considered to linked to hypothermia in anesthetic convalescent patients were gathered and examined employing univariate statistical analysis, along with the statistically important elements determined employing multifactor logistic regression analysis.

S.NO	AUTHOR	TECHNIQUE	SIGNIFICANCE	LIMITATION/ FUTURE SCOPE
48	Zhang.et.al	PPD risk forecasting framework is a data extraction, processing, and ML methodology.	There are few resources for predicting postpartum depression (PPD). The author proposes an ML technique for predicting the risk of PPD using data from EHRs.	Additional studies ought to tackle this along with comparing the data-driven initial treatment to traditional therapy in a clinical trial, as well as do additional validation research at research sites in the United States and abroad utilizing datasets with variable PPD prevalence.
49	Ellis.et.al	Machine learning models	The study aims to use EHRs to better understand	Finally, future research might look at

			opioid-dependent individuals and create an ML model to categorize patients based on their chance of acquiring a drug abuse diagnosis.	gene variations that are more prevalent in cases than controls. Such an investigation can reveal genetic variations that may affect drug misuse tendencies while also pointing to other mechanisms of action.
50	AlSaad.et.al	Recurrent neural networks (RNNs), single code-level attention mechanism	The use of this research is to measure the efficacy of PredictPTB, a clinical prediction algorithm, in predicting preterm birth using medical codes from electronic health records. It also attempts to give clinicians with insights regarding the model's interpretability.	The suggested framework could be utilized in the future to offer patient-specific predictions along with interpretations for further complications of pregnancy (including hypertension, gestational diabetes, preeclampsia, diseases, along with iron deficiency anemia) and pregnancy results (including variables such as delivery technique, stillbirth, miscarriage, and neonatal death).
51	Abraham.et.al	machine learning model	The aim of this investigation is to create an ML-based technique to predict the hazards of preterm delivery utilizing electronic health information, as preterm birth is one of the leading causes of child death worldwide.	Improved ML algorithms will be utilized in the future to examine the enormous phenotyping data from EHRs. Prediction accuracy can be improved by combining many data sources, such as genetic information, social determinants of health, environmental variables, wearable sensor data, and patient-reported outcomes.

52	Li.et.al	LR, RF, SVM, and extreme gradient boosting (XGBoost)	To use ML techniques to forecast the risks of pre-eclampsia (PE) in women by analyzing EHR data in the early second trimester.	Biases in this study were unavoidable, however, they were lessened by human chart review and extra exclusion standards. Additional study is needed to create additional models for forecasting early-onset PE.
53	Oliver-Roig.et.al	Machine Learning Models	The aim of this work was to apply ML techniques to estimate exclusive breastfeeding throughout the in-hospital postpartum period and to describe the behavior of the ML model in order to improve decision-making.	Future research should incorporate a breastfeeding follow-up for the first months of life, as well as additional risk variables such as family income, breastfeeding knowledge, attitude toward breastfeeding, and family support, to better comprehend the impacts of postpartum breastfeeding circumstances.
54	Gao.et.al	Bag of Words, Word Embedding, and Recurrent Neural Network (RNN)	The research compared the performance of DL algorithms to that of standard ML models in predicting severe preterm birth. Its goal was to discover EPB risk indicators and see if accurate forecasting might assist healthcare organizations manage resources.	Investigators will require to identify distinct kinds in the future in order to construct ML techniques capable of forecasting various kinds independently. Since GRU excels in a variety of tasks, we employed LSTM in place of GRU to train EPB prediction models and so future research will use GRU model to the test.
55	Manemann.et.al	Clinical Classifications Software (CCS), Ninth Revision (ICD-9) and Tenth Revision	The main objective is to use ML systems to analyze electronic health records (EHtoorder to discover	These electronic cohorts can be consumed in future studies to uncover novel sex-specific

		(ICD-10), Current Procedural Terminology (CPT)	new risk factors for complicated diseases. The authors acknowledge that the complexity and high quality of the data can make it difficult to analyze, but propose using sizable electronic population-based cohorts containing thorough EHR data that has been harmonized and processed to overcome this challenge.	hazards for complex disorders utilising cutting-edge ML approaches. With the help of these strategies, we will be able to deal with several EHR-related issues.
56	Debray.et.al	TRIPOD-Cluster.	The TRIPOD-Cluster statement seeks to enhance the reporting of research that construct or verifies multivariable models for forecasting utilizing clustered data in order to assess bias risk and clinical relevance.	The future scope of the TRIPOD-Cluster principles includes enticing researchers to collaborate and reach a consensus, implement and accept, evaluate, and update model specifications, data, code, and data sets. To improve and broaden the rules, cooperation, and consensus-building are necessary.
57	Ren.et.al	Logistic regression, XGB, and ANN3	The main aim is to investigate the usage of ML technique for forecasting the need for blood transfusions following cesarean sections, evaluating their effectiveness, and assessing the risk factors for hypothermia during anesthesia recovery.	In the future, the development of explainable models, feature engineering, integration of real-time monitoring data, and dataset expansion are essential to increasing the accuracy of risk factor predictions for hypothermia and blood transfusion.

According to this survey, for expectant mothers and young children, electronic healthcare systems provide several benefits, including improved information sharing, increased accuracy and efficiency, data-driven decision-making, and patient participation. These technologies simplify operations, increase accuracy and efficiency, and lessen the dependency on paper-based documentation. However, they also bring up issues with data security and privacy. To

preserve patient privacy and uphold trust, healthcare providers must employ strict security measures including encryption, access limits, and routine audits. The development and upkeep of electronic healthcare systems can be challenging and expensive in terms of hardware, software, and employee training. The smooth sharing of patient data can be hampered by system interoperability problems, and maintaining compatibility and standardization across systems continues to be difficult. Massive volumes of data may be produced by electronic healthcare systems, which can overwhelm healthcare professionals. To prevent cognitive overload and promote effective decision-making, healthcare practitioners must establish ways for managing and prioritizing information. Pregnant women and young children need equal access to electronic health care services, however, some groups may find it difficult to make use of these systems due to differences in technology, internet connectivity, and technological knowledge. The digital divide has to be closed, and all children and pregnant people should have equal access.

2.4 Health Care System Using Telehealth Data:

Dos Santos. et.al, [58] this study intends to examine how telehealth is being used in Brazilian primary care and determine whether there is a link between telehealth and treatment quality. A cross-sectional research was conducted to examine information technology, telehealth, and care-related issues with 29,778 primary care team members in Brazil in 2014, representing 92.5% of the country's existing healthcare groups. A multiple binary regression analysis was executed to evaluate the links among breadth of healthcare treatments with the use of telehealth.

Sakakibara. et.al, [59] This study evaluated the frequency of ER visits and hospitalization following the use of telehealth services via various communication channels, such as voice calls, video calls, and chat messaging. Between January 1, 2019, and December 31, 2020, women who used a telehealth consultation service in Japan (Sanfujin-ka Online) to consult with specialized doctors and midwives provided data on their obstetric and gynecologic problems. After the consultation, there were late-night emergency visits or hospitalizations. A chi-square test & multivariate logistic regression analysis were achieved to compare clinical results across groups that received telehealth services through chat messaging, phone calls, & video conferences. There was no discernible change in emergency room visits or hospitalizations following use of the telemedicine services for obstetrics and gynecology.

Parameswaran.et.al, [60] the purpose of the investigation was to learn how technologies influenced the perspectives of women who contributed in an 8-week group video conference intervention for prenatal depression (PD). The research included theoretical sampling as well as semi-structured focus groups with four to six women. Two coding teams performed an initial assessment employing grounded theory and a secondary analysis utilizing a qualitative description out. The study adds to the expanding body of data supporting prenatal women's good experiences participating in a video conferencing intervention for Parkinson's disease. Telehealth might represent a realistic and feasible platform for increasing access to and retention in mental health care among childbearing women. Additionally, this pilot project demonstrates how videoconferencing may be used to offer a variety of efficient and reasonably priced mental health treatments in places with limited resources.

Tian.et.al, [61] the aim of this research was to see if women with gestational diabetes mellitus (GDM) were capable of managing their blood glucose levels by obtaining medical information & lifestyle counseling via a WeChat group chat. A multicenter randomized controlled trial included an oral glucose tolerance test utilized to diagnose GDM in 309 women during 23 and 30 weeks of pregnancy. Based on the findings, the intervention group showed a higher glycemic qualification rate than the control group at practically all time points. Regardless of the kind of intervention, the glycemic qualification rate rose as the gestational weeks increased. Pregnancy outcomes that were measured, such as delivery method, early membrane rupture, preterm birth, infant's birth weight, and postpartum haemorrhage, did not show any discernible changes.

Leighton.et.al, [62] The study looks at the MFM telemedicine program of a significant health system's framework, implementation, and patient and child health results. According to observational data from electronic health records comparing maternity and birthing outcomes, telemedicine can be a useful alternative to in-person care. Patients save travel and work-related costs by $90.28 for each consultation, and the majority are pleased with their experience.

Duodu.et.al, [63] Utilizing Multiple Indicator Cluster Surveys, this research evaluates trends in prenatal care visits and associated features in Ghana from 2006 to 2018. The percentage of women receiving adequate and ideal prenatal care has steadily increased across all sociodemographic groups, according to the findings. Women in the Upper East Region that had a greater amount of formal education, health insurance coverage, & growing household wealth were more likely to receive adequate and/or excellent prenatal care.

Sung.et.al, [64] The study matched UAMS telemedicine records with Arkansas Medicaid claims from 2013 to 2016. In comparison to in-person treatment, the results indicated that UAMS telemedicine had fewer hospital admissions,

reduced insulin use rates, and lower maternity care costs. Women who received UAMS telemedicine had greater rates of insulin usage, more prenatal visits, and comparable maternity care costs. The incidence of cesarean section, severe maternal illness, and infant death was comparable amongst the three groups.

Rovelli. et.al [65] the aim of this investigation was to calculate the possible influence of telemedicine use on disease follow-ups. The investigation included 735 PKU/HPA patients that were kept up on at San Paolo Hospital's Clinical Department of Paediatrics, ASST Santi Paolo e Carlo, University of Milan, Italy. Following a year of implementing follow-ups, data on the telehealth model used, the types of consultations done, and the patient's perspectives were collected and analyzed retrospectively. The findings showed that telehealth appeared to be a beneficial technique to increase treatment adherence and that it might assure ongoing support and care regardless of the local epidemiological situation. Patients reported considerable pleasure with the services provided and asked that they be permanently incorporated into the standards of care.

Reisinger-Kindle. et.al [66] The author evaluated the use of telemedicine in a sizable academic metropolitan obstetric practice that caters to a medically underprivileged community using the RE-AIM paradigm. RE-AIM components were evaluated by reviewing clinic implementation procedures and retrospectively reviewing EHR data for all obstetric contacts between March 19 and August 31, 2020. The information that was retrieved covered demographics, the quantity and kind of prenatal visits (in-person or telemedicine), prenatal diagnosis, birth outcomes, and the quantity and type of postpartum visits. The data was analyzed utilizing descriptive statistics. The COVID-19 epidemic has altered conventional methods for providing healthcare. The paper demonstrates how, in the aftermath of a change in state policy, the RE-AIM framework may be effective in assisting a big academic urban obstetric practice in implementing telephone visits. This may be especially important in settings that treat patients who are more likely to have maternal morbidity and unsuccessful pregnancies.

Heřman. et.al, [67] The paper presents that in addition to the aforementioned disciplines, this type of remote care is appropriate for the treatment of low-risk pregnancies. It knows that this mode of communication between pregnant women and medical personnel will be well-liked and regularly used provided the application is of adequate quality and error-free, user-friendly, and straightforward. It is also defined as the delivery of benefits where distance is an essential consideration, utilizing technological advances in information and communication to exchange reliable data for the identification, treatment, and avoidance of illnesses and injuries, studies and assessments, and continuing education of healthcare professionals in order to better the health of people and their communities. One of the characteristics of telehealth is its utilization of information and communication technologies to address distance as a critical element. Distance medicine may be used as a technique to increase access to healthcare and also serve as a useful supplement to healthcare itself.

S. NO	AUTHOR	TECHNIQUE	SIGNIFICANCE	LIMITATION/ FUTURE SCOPE
58	Dos Santos.et. al	Cross-sectional study, Multiple binary regression analysis.	The goal of this research is to look into the use of telehealth in major healthcare in Brazil and see whether there is a link among telehealth and service quality.	In future, this study found associations among appropriate healthcare structuring and telehealth resources, focusing on the need to intensify initiatives to enhance and broaden the procedure of deploying health information technology in Brazil.
59	Sakakibara.et.al	Chi-square test and multivariate logistic regression analysis	This research evaluated the frequency of ER visits and hospitalization following the use of	Future studies should evaluate the implications of synchronous telehealth consultati

			telehealth services via various communication channels, such as voice calls, video calls, and chat messaging.	on services using additional emergency cases and important factors.
60	Parameswaran.et.al	Theoretical sampling, Videoconference intervention/UPLIFT program	The primary purpose of this investigation was to learn about the observations of women who participated in an 8-week group videoconference intervention for signs of Parkinson's disease, especially how technology influenced them.	Future studies should concentrate on those who choose not to participate in or stop using telehealth programs to find problems and solutions. Women's viewpoints can be used to enhance group telehealth programs intended to treat Parkinson's disease and guide future research.
61	Tian.et.al	WeChat Group Management (Intervention Group) or a routine	The purpose of this research was to see if deliverin	Future studies may look towards a more organized approach
		clinical prenatal care group	g health knowledge and behavioural counseling to women with GDM via a WeChat group chat was more effective than typical clinical prenatal care at managing blood sugar (BG).	to managing GDM using online group discussions. Pregnancy outcomes did not differ significantly from one another. To further understand this pattern, more research is required.
62	Leighton. et.al	The Division of Maternal-Fetal Medicine of Magee-Women's Hospital of the University of Pittsburgh Medical Center (UPMC).	MFM telemedicine services have grown due to the rise in maternal morbidity, particularly in rural regions. This research discusses the program's framework, implementation, and patient and child health results in a	Future research will analyze the efficacy of telemedicine consults in different fields of medicine and will extend the present MFM framework to include more regularly happening prenatal visits. The effect of MFM telemedicine

			significant health system.	consultation may also be investigated by disease cohort.
63	Duodu.et.al	STATA version 14, chi-square test, robust multinomial logistic regression	Utilizing Multiple Indicator Cluster Surveys, this research examined trends in prenatal care visits and related characteristics in Ghana from 2006 to 2018. It found that most pregnant women in Ghana do not meet the recommended timelines and are slowing down toward meeting the required minimum of eight visits.	The future scope includes increasing healthcare access and awareness, ensuring high-quality antenatal care services, enhancing maternal education and empowerment, solving socioeconomic disparities, tackling cultural and social norms, expanding the coverage and accomplish of healthcare facilities, mobile clinics, and outreach programs, and combining technology such as telemedicine and mobile health applications.
64	Sung.et.al	Propensity score matching	The goal of this investigation is to estimate the influence of High-Risk Pregnancy Programme at the University of Arkansas for Medical Sciences (UAMS) telemedicine program on the utilization of healthcare with medical expenses among pregnant women with diabetes and subsequent neonates.	In the future, the study needs to evaluate the consequences of the shift from the ninth to the tenth edition which occurs because of a shortage of observations using ICD-10 codes.
65	Rovelli.et.al	Video consultation was scheduled from April 2020 to March 2021 (in Italy,	The goal of the research was to evaluate the possible impact of using	Policy decisions should promote the use of telehealth techniques to improve

		security procedures began at the conclusion of February 2020, and telehealth was deployed).	telemedicine on disease follow-ups. The current research included 735 PKU/HPA patients who were getting follow-up care at San Paolo Hospital's Clinical Department of Paediatrics, ASST Santi Paolo e Carlo, University of Milan, Italy.	healthcare in the future, especially for PKU/HPA patients.
66	Reisinger-Kindle.et.al	RE-AIM, descriptive statistics	The objective is to evaluate the use of telemedicine in a sizable academic metropolitan obstetric practice that caters to a medically underprivileged community using the RE-AIM paradigm.	Considering the large racial and ethnic differences in obstetric care, future studies ought to examine the impact of telemedicine, particularly on these inequalities. If telehealth is discovered to be related to better results, it will be crucial to pinpoint the processes by which it works, such as removing obstacles to care access.
67	Heřman.et.al	Draft and communication methods	The main objective is to define telemedicine as a medical treatment that is delivered remotely using information and communication technologies.	In the future, sending this electronic medical report straight to the hospital information system will be feasible thanks to the application's compatibility with the most recent data standards for processing medical records.

According to this survey, pregnant women and young patients have several benefits from telehealth, including easy access to healthcare services, dependable treatment, online monitoring, and remote education. By removing the need for lengthy trips and time commitments, it enhances access to prenatal exams, pediatric consultations, and follow-up treatment. Healthcare practitioners can examine

data and give instructions remotely thanks to telehealth systems' support for remote monitoring of vital signs and health metrics. Healthcare providers must maintain privacy and data security since physical exams during telehealth meetings may be restricted. It can be difficult to establish a personal connection with healthcare professionals during virtual visits, but by addressing these issues, healthcare practitioners can maximize the advantages of telehealth while ensuring that pregnant women and children receive high-quality treatment.

3. CONCLUSION:

To enhance healthcare outcomes and experiences for vulnerable groups, the healthcare system for children and pregnant women uses a predictive data analytic architecture that incorporates vital signs and measurements, telehealth data, behavioral data, and electronic health records. This system makes use of cutting-edge analytics and machine learning approaches to offer insightful data, generate reliable forecasts, and implement proactive actions to improve care delivery. Healthcare practitioners may more effectively monitor the health state of infants and pregnant women using vital signs and measurement data, which helps them spot patterns, abnormalities, and early warning signs of possible health hazards. Telehealth data makes it possible for remote monitoring, virtual consultations, and health education, which lessens the load on patients. Healthcare professionals can identify risk factors for mental health problems and suggest the best therapies with the use of behavioral data. A whole perspective of a patient's medical history is provided by electronic health records (EHRs), improving prediction skills and enabling data-driven choices. Overall, the healthcare system's predictive data analysis framework for pregnant and young patients has the power to transform how the treatment is provided and enhance patient outcomes.

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