Artificial Intelligence in The Detection and Monitoring of Intimate Partner Violence Among Women Living With HIV/AIDS: A Systematic Review of Tools, Models, And Ethical Implications

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Abstract - The systematic review delved into the application of artificial intelligence in the detection and monitoring of intimate partner violence among women having HIV/AID. It focuses on exploring artificial intelligence tools and models that is designed to detect the victims of intimate partner violence, underscoring their effectiveness and limitations. In addition to this, the study tackled ethical considerations like consent, privacy, bias showing the need for responsible artificial intelligence deployment. The findings highlight that artificial intelligence offers valuable support in intimate partner violence intervention, adequate care to ethical frameworks is important to protect and enhance this vulnerable population.

Keywords: Artificial Intelligence, intimate partner violence, women, HIV/AID, Bias

I. INTRODUCTION

Intimate partner violence is a crucial issue in today's societies. Of all the available tools for addressing this problem, the application of technology has the potential to provide an innovative method for reducing the impact of the issues created by the violence [1-3]. Thus, violence against women as well as girls represents a global health problem which is characterized by physical, psychological and social effects [4-6]. It was established that violence against women and girls have a very high statistics which range from 1 in 3 women in their lifetime [7]. In fact, it was established that about two hundred million women are currently experiencing genital manipulation, sexual assault by a non-partner with the women experiencing physical and sexual violence [8-11]. Also, it was reported that a woman is murdered every minute by their sexual partner, intimate partner, which usually result in about 50000 death annually [12]. Violence among women result generally in mental and physical impact with injuries inclusive, trauma as well as increase in chronic health problems [13-15]. More so, the economic effect is very substantial, causing effect in the health care system, families and productivity losses. Most survivors will bear medical and healthcare expenses [16]. While interventions against intimate partner violence have tried to deploy traditional method through social, legal, community and technology-based approach, however, the coming of digital technology has improved and expanded these interventions significantly [17-20]. Thus, deploying digital technologies especially artificial intelligence-based preventions and response approach represents an evolving frontier [21]. Artificial intelligence renders a potential intervention such as emergency support services to violence survivors [22]. It ranges from planning of safety, application of assessment to platforms which promote the character change among the perpetrators [23-24]. Artificial intelligence smart services, its utilization and the tools integrated novel approach in handling domestic violence and intimate partner violence [25-27]. The results of the highlights on the public health as well as societal problem represent the leading narratives of domestic violence that was interpreted as gender related violence [28]. Thus, the highlights on the emerging trend of the role of artificial intelligence-based technique in the identification and prevention of domestic violence [29]. However, it was argued that there are few recommendations to professional about

regarding how the strategies could be deployed as well as the smartness of the high technology which was challenged the basic technology from the perpetrators creating a form of imbalance which can reduce an impactful development [30-32]. It was reported that there are intimate partner femicide which is regarded as a serious social health condition that affects women worldwide with evidence of 30000 women dying annually in the hands of both the current and previous intimate partners [33]. Studies have revealed that there are risk factors that are associated with intimate partner femicide and the development of the risk assessment tool for identifying them is quite significant. But this significant aspect has been overlooked by the victims especially in their strategies for coping with intimate partner violence [34-36]. Understanding the victim's coping strategy will help to provide insights into how to deal with the abuse as well as informing the development of effective intervention and prevention approach [37-40].

II. MONITORING OF INTIMATE PARTNER VIOLENCE AMONG WOMEN LIVING WITH HIV/AIDS: ARTIFICIAL INTELLIGENCE PERSPECTIVE

Despite the use of a preventive approach, violence among intimate partners has continued to be an issue in the entire world. Current approaches for reducing the violence have revealed mixed success with innovative strategies needed to prevent the occurrence of violence especially among women living with HIV/AIDS [41-42]. Using artificial intelligence in these preventive strategies for detecting is gaining weight in research, especially in the use of voice signal data detection of individual at risk of perpetrating intimate partner violence [43-44]. However, no review study has established the accuracy of artificial intelligence in identifying individuals at risk of violence perpetration [45]. Figure 1 revealed that studies are yet to be carried out in these areas.
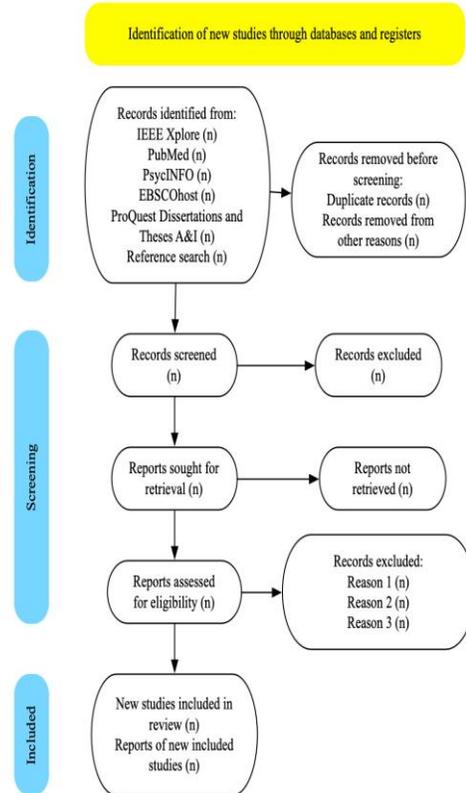

Figure 1: Overview of areas where studies are yet to be performed [45]

A study on the classification of domestic violence Persian textual content within the social media, according to [46], based on the significance of the monitoring social networks to classify domestic violence content as well as extracting the knowledge for conducting the preventive measures showed the significance [47]. The study involved the collection of Persian textual data with the use of hashtags connected to domestic violence from Twitter, Telegram, Instagram between 2020 to 2023 April. The contents obtained were then considered for the modelling of the topic using an algorithm [48]. Through the extraction of probabilities of each topic for the document within the dataset, the topic with the highest probability to be labelled for that document was considered [49]. After following the extraction of the features from the labelled dataset, stacking and voting ensemble learning approach were deployed [50]. Figure 2 depicts the top 20 most frequent words usage observed within the dataset with Iran having the highest frequency followed by women, murder and sex [51]. Also Figure 3 showed the model performance of the topic in which the graph

at the left demonstrates topics in a 2-dimensional space while that on the right illustrates the heatmap and it showed the correlation between the topics.
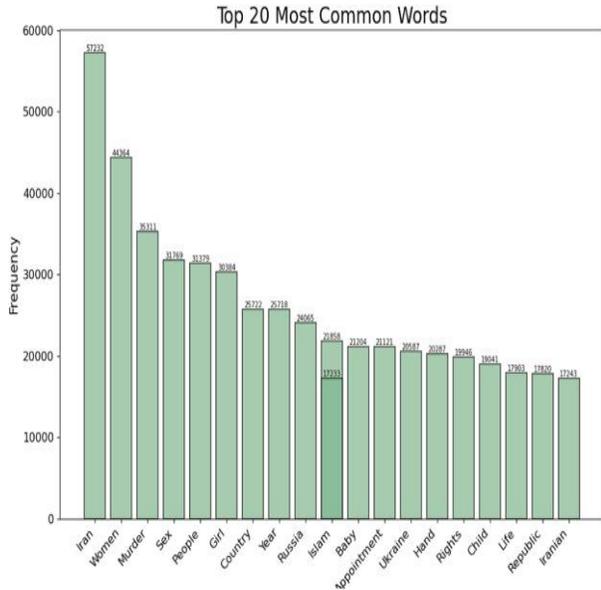

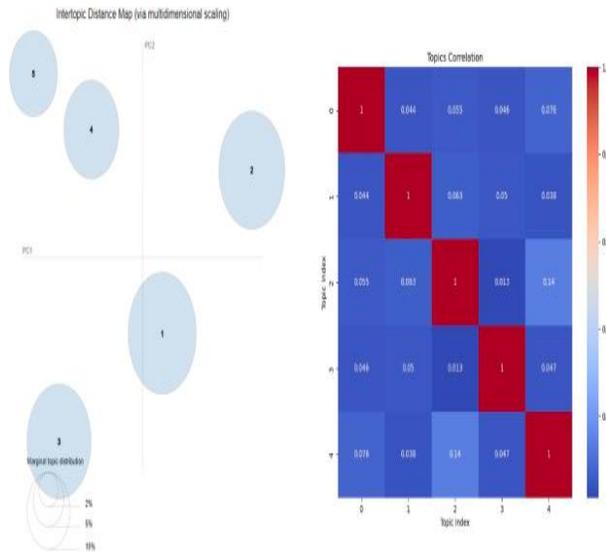Figure 2: Top 20 most frequent word usage [46]

Figure 3: Model performance of the topics [46]

III. ETHICAL IMPLICATIONS ON ARTIFICIAL INTELLIGENCE USAGE FOR HIV/AIDS WOMEN EXPERIENCING INTIMATE PARTNER VIOLENCE

The most practical areas where artificial intelligence is deployed in nursing is in the delivery of nursing care and services. Artificial intelligence has a direct impact and effect on the patient in their time of need. Some of those areas of impact could be Medicare, clinical care, nursing care, home health care, robotics, comorbidity, regenerative medicine as well as therapies like the genomics [52-55]. According to a study by [56], empowering women through the use of digital health technologies like artificial intelligence is quite significant with evidence. However, there are several barriers that prevent access to the usage a swell as limitation to its applicability of artificial intelligence.

While these barriers not only prevent women from the benefits of digital health like the artificial intelligence, it however, shows negative effects which result from the access and utilization of the digital tool [56]. Thus, the barriers identified could be translated as negative impact in the analysis [57]. The analysis of the content identified 10 different factors which hinders women's access to the use of artificial intelligence across the globe as well as 14 barriers which stopped the use of the digital technologies as shown in Figure 4. Some of these barriers include the privacy concern, violence, interpersonal as well as space restriction [58]. These barriers showed the complex display between access, use and the possibility for negative outcomes [60]. As highlighted in the Figure [61].
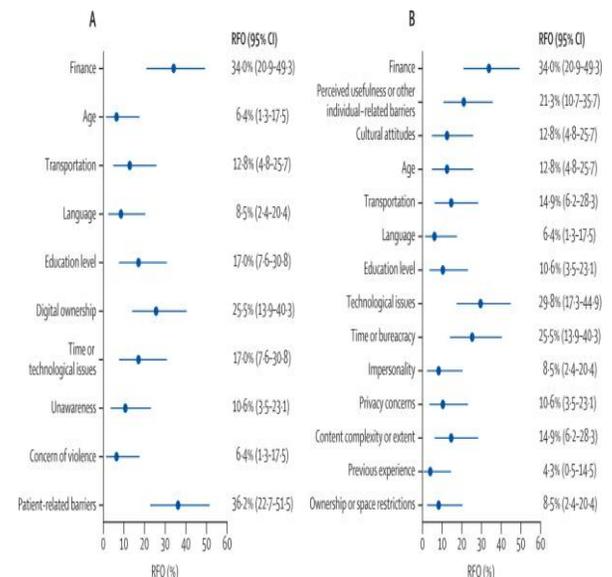

Figure 4: Results showing the impact of digital health technologies on the health status of women [61]

There are basic principles involved in nursing ethics which include; justice, beneficence and nonmal

eficence [62]. The term beneficence emphasizes the moral responsibility of the physicians to promote the well-being of their patient [63]. It involved the prevention of harm, helping individual with disabilities and acting to help those in danger. In the case of nonmaleficence, which is closely related needs the physicians to avoid causing harm and carefully weigh the benefit and the subsequent risks of medical interventions [64-65].

Furthermore, justice focus on the distribution of healthcare resources that could be achieved through various strategies like prioritizing those that are in need. The autonomy confirms the rights of individual to make decision about their care [66-67]. This autonomy also contains a framework like the consent, true telling and confidentiality which becomes significant in the area of artificial intelligence [68]. This will definitely raise a strong concern on ethical questions about the healthcare [69]. A very important dimension that is related to justice in artificial intelligence driven healthcare is fairness that involves the equitable access to adequate quality care as well as equal health outcomes different patient populations [70].

In the area of fairness, it requires addressing biases that originate from data itself, algorithm design as well as the interaction between artificial intelligence systems, healthcare providers and the patients [71]. Furthermore, data biases like minority bias can accelerate the existing healthcare disparities [72]. For instance, cardiovascular risk models that are trained mainly on male patient may inaccurately predict the risk in female patients causing inadequate care [73]. In the same vein bias in missing data could arise when information from patient groups is systematically absent, stopping artificial intelligence's potential in delivering a reliable prediction [74-75].

IV. CONCLUSION

Artificial intelligence holds important promise in improving the detection and monitoring of intimate partner violence among women having HIV/AIDS through enhancing the accuracy and timeliness of responses. However, the utilization of artificial intelligence must carefully tackle the address of ethical concerns which include consent, privacy, potential biases to ensure they support vulnerable populations without resulting in harm.

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