



State of the Art on Suicide Studies in Morocco: Trends, Risk Factors and Implications for Prevention

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Abstract:

Suicide remains a pressing public health concern in Morocco, yet the research landscape surrounding this issue is relatively sparse. To address this gap, we conducted a comprehensive review of 96 articles about suicide in Morocco, sourced from the Scopus database. Focusing on the period from 2014 to 2023, 68 articles were selected for detailed analysis, revealing critical insights into the multifaceted nature of suicidal behavior in the country. Through a thematic categorization of the literature, encompassing domains such as Suicidal Behavior and Mental Health, Epidemiology and Risk Factors, Psychological Disorders, Suicide Prevention, Medical Emergencies, and Methodology and Technology, our review synthesized vital findings and trends in Moroccan suicide research. Notably, the analysis illuminated concerning patterns of suicidal behavior and identified significant risk factors, including mental health disorders, psychosocial stressors, and socio-economic challenges. In light of these findings, urgent attention is warranted to develop and implement targeted prevention strategies tailored to the unique needs of the Moroccan population to mitigate the impact of suicide on individuals, families, and communities alike.

Keywords: Suicide, Morocco, State of the art, Suicidal behavior, Health, Families.

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1. INTRODUCTION

Suicide is a complex, multifactorial phenomenon that represents a significant public health challenge worldwide. According to the World Health Organization (WHO), almost 700,000 people commit suicide every year, making

it one of the leading causes of death worldwide, particularly among young adults [1]. Suicide not only takes a heavy toll on individuals and families but also imposes substantial economic and social burdens on communities. Despite efforts to address the issue, suicide rates continue

to rise in many parts of the world, underscoring the urgent need for in-depth research and effective prevention strategies [1].

Societal awareness of suicide as a complex phenomenon has grown, prompting a surge in research efforts worldwide. Recent international studies have delved into various aspects of suicidal behavior, shedding light on emerging trends and underlying mechanisms. For instance, research by Peshkovskaya *et al.* [2] has explored suicide-related groups and school shooting fan communities on social media, employing network analysis to unravel the dynamics of online interactions. Similarly, Cai *et al.* [3] have investigated the interrelationships between depressive and anxiety symptoms with suicidality among adolescents, providing valuable insights into the intricate network of mental health factors contributing to suicide risk. Additionally, Mundriyevskaya *et al.* [4] examined online harmful content, particularly violent fan communities on social media platforms, highlighting the potential influence of online environments on suicidal behavior. By incorporating findings from these studies, our research seeks to contextualize the study of suicide within the broader global landscape, enriching our understanding of the phenomenon before focusing on the specific socio-cultural context of Morocco.

In recent years, there has been a growing awareness of the importance of studying suicide in specific cultural and socio-economic contexts. One such context that deserves particular attention is Morocco, a North African country with a rich cultural heritage and diverse population [5]. Although Morocco has made significant progress in improving healthcare and social services in recent decades, suicide remains a relatively understudied and poorly understood phenomenon in the country. Given the potential impact of suicide on individuals, families, and communities, there is an urgent need to better understand the factors contributing to suicidal behavior in Morocco and to develop targeted interventions to prevent loss of life and alleviate suffering.

In the Moroccan Human Rights Association's (AMDH) annual report [6] on suicide attempts in Morocco, it is emphasized that this subject is still largely taboo, with no preventive measures or official national statistics. The AMDH highlights the lack of available data. At the same time, reports from the World Health Organization (WHO) indicate that the number of suicides in Morocco exceeds a thousand cases per year, with more than three cases per day - alarming figures for Moroccan society. The regions most affected, according to experts, include Tangier-Tetouan-Al Hoceima [7]. The leading causes of suicide attempts are attributed to a deterioration in psychological state, where health, social, and economic factors overlap, with a notable prevalence of mental and psychiatric disorders among the Moroccan population.

This situation is prompting the government to review the mental health system in response to WHO recommendations, which stress the importance of considering mental health on an equal footing with physical health. Confinement, social isolation, and economic and family

difficulties exacerbate these problems, particularly among young people. Although suicide is potentially the second leading cause of death among 15-29-year-olds, official surveys are needed to confirm this trend. In addition, the AMDH points out that oral or behavioral warning signs precede the majority of suicides. However, the stigma associated with suicide often makes it difficult for those in distress to find help [7]. In response to these challenges, initiatives such as the Stop Silence emotional helpline run by the association "Reda's Smile" have been set up to offer free, anonymous support to people in distress despite the persistent challenges of openly addressing this subject in society [8].

Morocco is faced with an alarming prevalence of suicide, a reality that has been highlighted in several reports and studies. Data from the World Health Organization (WHO) indicate that the number of deaths by suicide exceeds one thousand every year, with an average of more than three cases per day [7]. This worrying trend highlights the scale of the problem and underscores the urgent need for effective intervention to prevent loss of life and reduce the associated suffering [7].

The need for an in-depth study of suicide in Morocco is compelling. Despite growing attention to this public health problem, it remains largely understudied and poorly understood in the Moroccan context. Understanding the determinants of suicide, its risk factors, and its consequences is essential to inform mental health policies, guide preventive interventions, and improve support services for those in distress.

This study aims to carry out a comprehensive review of suicide research in Morocco, focusing on the period from 2014 to 2023. We strive to identify emerging trends in suicidal behavior, analyze associated risk factors, and assess the effectiveness of implemented prevention strategies. By better understanding the dynamics of suicide in this specific context, we aim to contribute to the development of mental health policies and programs better adapted to the needs of the Moroccan population.

This document is structured into several vital sections. The methodology details the approach used to select and analyze the relevant articles, while the results present the main findings of the review. The discussion interprets these results in the light of existing literature, highlighting their implications for clinical practice and public health policy. Finally, the conclusion summarizes the study's main findings and suggests directions for future research and interventions in suicide prevention in Morocco.

2. METHODOLOGY

2.1. Research Design

The present study aims to carry out a comprehensive review of research on suicide in Morocco to synthesize current knowledge on this crucial public health issue. This methodological approach was chosen because of its ability to aggregate the results of several empirical studies, thus providing an overall view of the trends, determinants, and consequences of suicide in the Moroccan context. The

main objective of the review is to fill gaps in the existing literature by identifying risk factors associated with suicide, assessing the effectiveness of preventive interventions, and proposing recommendations for clinical practice and mental health policy in Morocco. By adopting a rigorous and systematic approach, this study aims to provide reliable empirical data and inform policymakers, clinicians, and researchers about best practices in suicide prevention.

The research design is based on a transparent and reproducible methodology, in line with international standards for review. By following a pre-established protocol and applying clear inclusion/exclusion criteria, we aim to guarantee the validity and reliability of the results obtained. We are also committed to respecting the ethical principles of research, ensuring data confidentiality, and avoiding bias in selecting and interpreting studies included in the review.

In summary, the research design is based on a systematic and methodical approach to synthesizing existing knowledge on suicide in Morocco. By adopting a global perspective and integrating the results of multiple studies, this review aims to provide valuable insights into the prevention and management of suicide in this country.

2.2. Search Strategy

To comprehensively identify relevant articles on suicide in Morocco, a systematic search strategy was meticulously implemented. Initially, the Scopus database's expansive coverage of scientific literature was leveraged using the Scopus Advanced search [9]. The primary keywords utilized were "suicide" and "Morocco." This initial search yielded a substantial pool of 96 potentially relevant documents.

The first stage of the search involved using the following search terms: "suicide" and "Morocco."

TITLE-ABS ("suicide") AND (LIMIT-TO (AFFIL COUNTRY,"Morocco")).

To refine the search and focus on recent literature, an additional search was conducted to target articles published between 2014 and 2023. This temporal restriction was implemented to ensure the inclusion of the most up-to-date and pertinent research findings. Consequently, the search was narrowed using the specific terms "suicide" and "Morocco," coupled with the specification of publication years between 2014 and 2023.

TITLE-ABS ("suicide") AND PUBYEAR > 2013 AND PUBYEAR < 2024 AND (LIMIT-TO (AFFIL COUNTRY ,"Morocco")).

The refined search strategy aimed to filter out older studies and prioritize recent publications, thus capturing the latest insights and developments in the field of suicide research in Morocco. Furthermore, explicit inclusion and exclusion criteria were applied to select articles for analysis. These criteria encompassed the relevance of the content to the topic of suicide in Morocco, the methodological rigor of the studies, and the availability of data for

thorough analysis.

Following the elimination of duplicate records, a meticulous screening process was undertaken involving the evaluation of article titles, abstracts, and full texts. This meticulous approach ensured that only high-quality and pertinent articles meeting the study's objectives were included in the final review. Through this systematic search strategy, a robust selection of literature was assembled, facilitating a comprehensive examination of suicide-related issues in the Moroccan context.

Fig. (1) shows the number of papers published on suicide in Morocco by year of publication. Data analysis reveals a significant trend in the number of publications over time. In 2014, eight documents were published, marking the beginning of the period studied. This quantity then experiences a slight decline in 2015 and 2016, with five publications each year. However, an upward trend became apparent in 2017, when the number of documents published on the subject gradually rose. This trend continues until 2023, when the peak is reached with 14 papers published, demonstrating a growing interest in suicide research in Morocco.

These results highlight the dynamic evolution of academic attention to this issue over the years. The fluctuations observed may reflect various factors, such as changing research priorities, methodological advances, and social pressures. This temporal analysis provides valuable insight into the progression of suicide research in Morocco. It underlines the importance of closely monitoring this evolution to inform the country's public health policies and preventive interventions.

In Fig. (2), we present the distribution of documents on suicide in Morocco according to their type of publication. An analysis of the data reveals diversity in the formats of the documents studied. Articles are the most frequent category, representing the majority of publications with 49 articles. Next, papers presented at conferences comprise a significant proportion, with 13 documents identified. Book chapters and journals represent more modest proportions, with three papers each. This distribution highlights the variety of publication formats used in suicide research in Morocco, reflecting the different platforms used by researchers to share their findings and analyses.

This breakdown of papers by type provides a helpful overview of the diversity of information sources available on the subject. As the most common format, articles will likely offer in-depth analysis and empirical data. At the same time, conference papers can offer more innovative perspectives and preliminary results. Book chapters and journals, although fewer in number, can also play an essential role in disseminating knowledge and promoting academic dialogue on suicide in Morocco.

In Fig. (3), we present the distribution of documents on suicide in Morocco by author affiliation/university. Data analysis reveals diversity in the affiliated institutions of the authors of the papers studied. Mohammed V University in Rabat stands out as the most represented

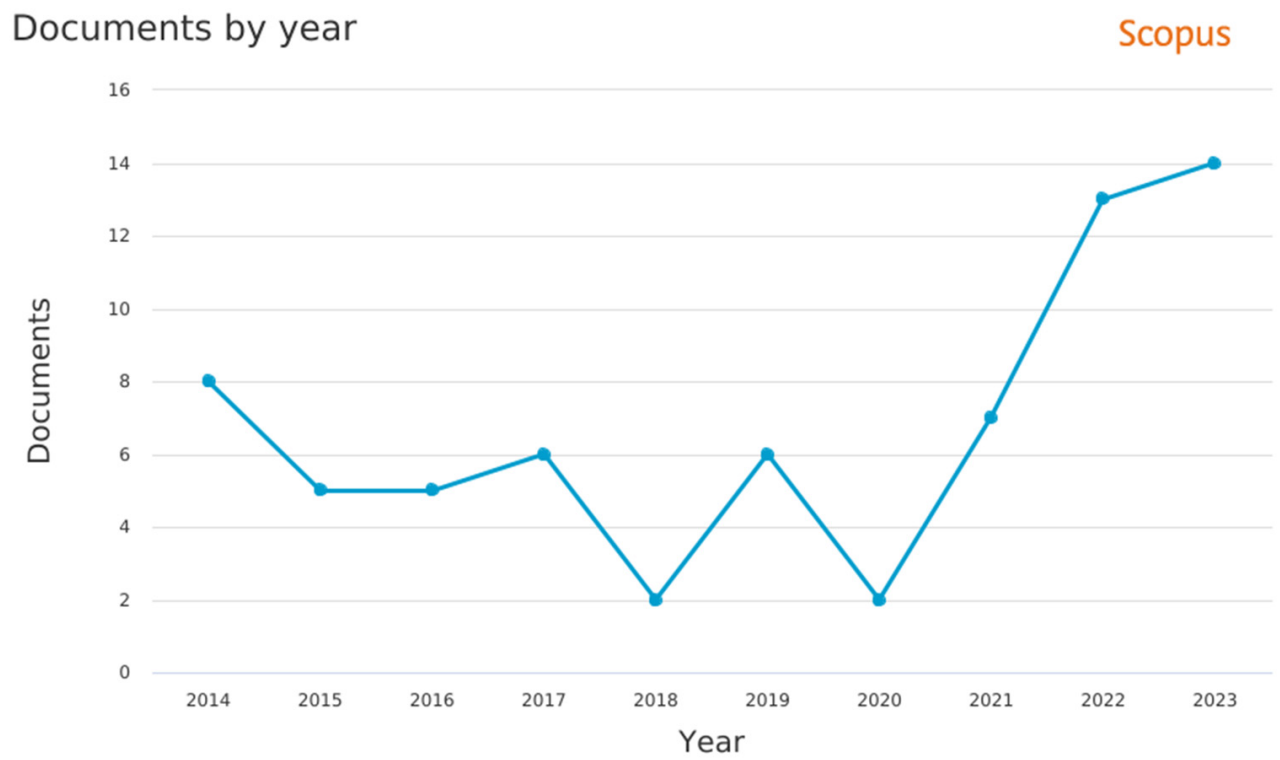


Fig. (1). Number of publications on suicide in Morocco by year (2014-2023).

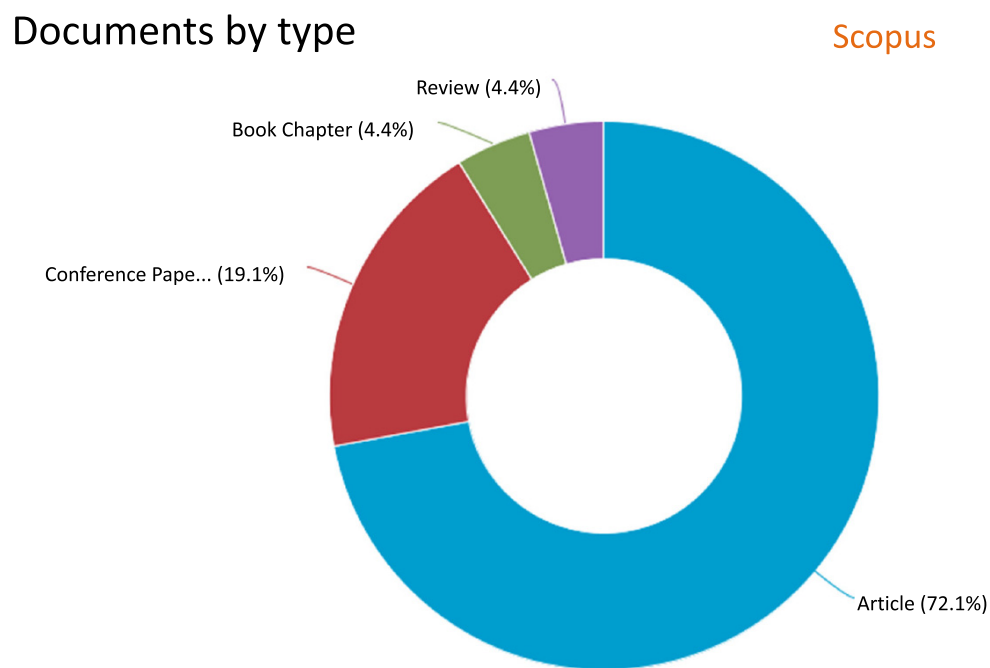


Fig. (2). Distribution of documents on suicide in morocco by type of publication.

study's research objectives. Using the structured CSV file, we efficiently gathered the information on the selected articles, a fundamental step in the research process.

2.4. Inclusion and Exclusion Criteria

To ensure the comprehensiveness of the review process, inclusion and exclusion criteria were established clearly. Inclusion criteria encompassed studies published between 2014 and 2023, specifically addressing the topic of suicide in Morocco, regardless of study design. These criteria aimed to capture a wide range of research methodologies and findings related to suicide within the Moroccan context. Conversely, exclusion criteria included studies not directly focusing on suicide or suicide attempts, those conducted outside Morocco, and articles not available in English or French. By considering studies in both English and French, the review aimed to encompass a broader spectrum of research conducted in Morocco and ensure a comprehensive analysis of the available literature.

Throughout the article selection process, these inclusion and exclusion criteria were consistently applied by all reviewers. This rigorous approach helped ensure the selection of studies meeting predefined standards of relevance and quality. By including studies in both English and French, the review sought to provide a holistic understanding of suicide research in Morocco, considering findings from diverse linguistic sources. This methodological approach aimed to enhance the robustness and reliability of the review findings, facilitating a nuanced analysis of the factors contributing to suicidal behavior in Morocco.

2.5. Data Analysis

Before discussing the statistical methods or qualitative approaches used in this study, it is essential to present the data organization process. The 68 articles selected were systematically grouped into six thematic categories to facilitate the analysis and interpretation of the results. These categories were identified based on the leading emerging research themes in the literature on suicide in Morocco. The categories are as follows:

2.5.1. Prevalence of Suicide in Morocco

This category includes articles that examine the prevalence of suicide in Morocco, including suicide rates, temporal trends, and associated risk factors.

2.5.2. Suicide Risk and Protective Factors

This category encompasses a series of articles exploring various aspects of the prevalence, characteristics, and factors associated with suicidal behavior in Morocco.

2.5.3. Mental Health and Psychiatric Disorders

Articles in this category explore the links between suicide and mental disorders such as depression, schizophrenia, and substance use disorders.

2.5.4. Prevention and Intervention

This category includes research into suicide prevention strategies, psychosocial interventions, awareness programs, and support services for people at risk.

2.5.5. Social and Cultural Factors

Studies in this category examine the social, cultural, economic, and religious factors that influence suicide and attitudes toward it in Moroccan society.

2.5.6. Innovative Technologies and Interventions

This category includes research into using technologies such as artificial intelligence, social networks, and mobile applications to detect, prevent, or intervene in cases of suicidal risk.

Each article was assigned a category according to its thematic content and research objectives. This classification helped to structure the data and facilitate the comparative analysis of studies on similar aspects of suicide in Morocco. By presenting the data organized by category, we can highlight significant trends and patterns in the existing literature, enriching our understanding of suicide in this context.

2.6. Data Summary

Data synthesis involves reviewing and summarizing the main findings and observations from the articles grouped under each thematic category. For each category, we conduct an in-depth analysis of trends, recurring themes, and significant findings presented in the literature.

By examining the articles included in each category, we identify key emerging patterns and findings relating to suicide in Morocco. This may contain information on suicide prevalence rates, associated risk and protective factors, prevention and management interventions, as well as relevant social, cultural, and economic aspects.

The data synthesis highlights research gaps, areas requiring attention, and practical implications for suicide prevention and intervention in Morocco. By providing a comprehensive analysis of existing knowledge, this stage of the research helps inform policy-makers, practitioners, and researchers about best practices and effective strategies for tackling this complex public health problem.

To conclude the methodology section, it is essential to highlight the systematic approach used to collect, organize, and analyze data relating to suicide in Morocco. Using a rigorous methodology, we could group the 68 selected articles into six distinct thematic categories, enabling us to exhaustively explore the different aspects of the suicide phenomenon in this context. The methodology guarantees the results' reliability and validity, providing a solid basis for discussing and interpreting the findings presented in the results section.

3. RESULTS

The results section presents a detailed analysis of the main findings from the literature review on suicide in Morocco. By examining the data organized by thematic

category, we have identified trends, patterns, and factors influencing suicide in this context. This section highlights the challenges faced by researchers, healthcare professionals, and policy-makers in preventing and managing suicide while highlighting opportunities for intervention and improving mental health policies in Morocco.

3.1. Prevalence of Suicide in Morocco

Suicide has become a growing public health problem in Morocco, requiring a better understanding of its prevalence and characteristics. This section reviews various recent studies conducted to understand the frequency of suicide and associated factors in the Moroccan population.

3.1.1. Mortality in a Moroccan Psychiatric Hospital

This retrospective study [10] analyzed mortality data in a Moroccan psychiatric hospital over ten years. The results revealed that cardiovascular disease and neuroleptic malignant syndrome were the leading causes of death among psychiatric patients.

3.1.2. Exploring the Prevalence and Profile of Suicide Cases in the Population of Northern Morocco (2017-2022) [11]

This study examined the prevalence and characteristics of suicide cases in the northern region of Morocco over six years. The results highlighted the high prevalence of suicide among single, poorly educated, and unemployed men living in rural areas.

3.1.3. Suicide Attempts in Morocco: A Systematic Review

This systematic review [12] examined several studies of suicide attempts in Morocco to describe the epidemiological profile of suicide attempts and identify associated factors. The results highlighted the importance of implementing national prevention strategies.

3.1.4. Evaluation of the Quantitative Risk of Suicide by Voluntary Intoxication Among Women in Morocco

This study [13] evaluated the risk of suicide by voluntary intoxication among Moroccan women, examining epidemiological characteristics and associated factors. The results highlighted the importance of early and effective management of those at risk.

3.1.5. Suicidal Ideation in Elite Schools

A Test of Interpersonal Theory and Suicide Escape Theory - This study [14] compared two contemporary theories of suicidal behavior - interpersonal theory and suicide escape theory - to predict suicidal ideation. Results showed that both theories explained a unique and cumulative portion of the variance in suicidal ideation among students.

3.1.6. Self-injury in Hospitalized Patients Concerning 19 Cases

This study [15] examined self-injurious behavior in patients hospitalized in the psychiatry department of the Mohammed V Military Hospital in Rabat. The results

highlighted the importance of early and appropriate management of patients presenting with self-injurious behavior.

This research offers crucial insights into the prevalence of suicide in Morocco and the associated risk factors, providing valuable information to guide public health policies and prevention initiatives.

3.2. Suicide Risk and Protection Factors

This category explores the various risk and protective factors associated with suicide in Morocco. The articles examine the demographic, social, psychological, and environmental characteristics that may influence suicide risk among Moroccan individuals, as well as the protective factors that may mitigate this risk.

3.2.1. Suicide Literacy Mediates the Association Between Religiosity and Suicide Stigma Among Muslim Community Adults: Cross-sectional Data from four Arab countries

The article [16] examines the relationship between religiosity, suicide literacy, and suicide stigma among Arab-Muslim adults. Results show that suicide literacy mediates the association between religiosity and suicide stigma, suggesting that improving suicide literacy could mitigate the effects of religiosity on suicide stigma.

3.2.2. Suicide Attempts Among Patients with Schizophrenia: A cross-sectional Study in Morocco

The author [17] focuses on suicide attempts among schizophrenic patients in Morocco. The results reveal that 32% of schizophrenic patients attempted suicide and that visual hallucinations were significantly prevalent among patients who attempted suicide. This study highlights the importance of understanding the socio-demographic and clinical characteristics associated with suicide attempts to identify patients at risk and provide appropriate support.

3.2.3. Prevalence and Risk Factors of Suicide Attempts Among Patients with Severe Psychiatric Disorders in Eastern Morocco

The article [18] examines the prevalence of suicide attempts among patients with severe psychiatric disorders in eastern Morocco. The results indicate that 31.2% of patients have a personal history of suicide attempts, with risk factors such as alcohol consumption, family history of psychiatric disorders, and suicide.

3.2.4. Acute Dapsone Poisoning with Methemoglobinemia: A Case Report

This study [19] reports a case of acute Dapsone poisoning with methemoglobinemia treated solely with ascorbic acid and activated charcoal. This study highlights the possible efficacy of ascorbic acid and activated charcoal in treating methemoglobinemia due to Dapsone poisoning.

3.2.5. In a Quantitative Assessment of the Risk of Suicide by Self-poisoning among Women in Morocco

The author [13] discusses the epidemiological characteristics of attempted suicide by self-poisoning among

women in Morocco. The results highlight the importance of age, the product involved, and the origin of the victims in the evolution of the clinical outcome of suicide attempts.

3.2.6. Depression and Anxiety Disorders in Chronic Hemodialysis Patients and their Quality of Life: A Cross-sectional Study of 106 Cases in Northeastern Morocco

The article [20] assesses the prevalence of depressive and anxiety disorders as well as suicidal ideation in hemodialysis patients in Morocco. The results underline the importance of collaboration between nephrologists and psychiatrists to improve the management of hemodialysis patients.

3.2.7. Suicidal Behavior in Moroccan Students: Prevalence and Association with Sociodemographic Characteristics and Substance Use: A Cross-sectional Study

This study [21] examined the prevalence and risk factors for suicidal behavior in Moroccan students. Results showed that risk factors included female gender, educational level, urban areas, low family income, parental divorce, and use of psychoactive substances.

3.2.8. Self-mutilation of the Penis or Gender Suicide. Three Cases of Schizophrenia

Through the study [22] of three cases of schizophrenia, this article sheds light on the psychotic mechanisms behind self-mutilation of the penis. It underlines the importance.

These studies provide crucial information for understanding the trends, risks, and factors associated with suicidal behavior in Morocco, underlining the importance of developing targeted interventions to prevent suicide and improve the mental health of the population.

3.3. Mental Health and Psychiatric Disorders

The category of mental health and psychiatric disorders explores various aspects of cognitive and psychiatric conditions in Morocco, highlighting the challenges, prevalences, and clinical implications of these disorders. These studies examine the links between psychiatric disorders and suicidal behavior, the impact of trauma history on mental health, and the prevalence of substance use and its consequences in schizophrenic and suicidal patients.

3.3.1. Impact of Childhood Sexual Abuse on Suicidal Behavior in a Population of Moroccan Women with Severe Psychiatric Disorders

The study [23] of the effects of childhood sexual abuse on suicidal behavior in Moroccan women with severe psychiatric disorders highlights a significant prevalence of suicide attempts among victims of sexual abuse. The results emphasize the importance of screening psychiatric patients for a history of CSA to prevent suicidal behavior and improve patients' quality of life.

3.3.2. Clinical Profile of Schizophrenia Comorbid with Obsessive-compulsive Symptoms: A Comparative Study

An analysis [24] of the clinical profile of schizophrenia comorbid with obsessive-compulsive symptoms highlights significant differences in the severity of psychotic symptoms, anxiety, depression, and vocational disengagement between schizo-obsessive patients and those who have schizophrenia alone. These findings underline the importance of careful assessment of obsessive-compulsive symptoms in the management of schizophrenia.

3.3.3. Post-traumatic Stress Disorder in Patients Treated for Schizophrenia: A Cross-sectional Study in the Psychiatric Department of Oujda, Morocco

The study [25] of post-traumatic stress disorder in patients treated for schizophrenia highlights a notable prevalence of this disorder in schizophrenic patients, underlining the importance of a thorough assessment of trauma history in patients with severe psychiatric disorders.

3.3.4. A Cross-sectional Study of Substance Use Among Schizophrenic Patients Hospitalized for Relapse at the Ar-Razi Psychiatric Hospital in Salé, CHU Ibn Sina Rabat, Morocco

The study [26] of substance use among schizophrenic patients hospitalized for relapse highlights a high prevalence of psychoactive substance use, particularly tobacco, cannabis, and alcohol, among schizophrenic patients. These findings underline the need for integrated management of mental health and substance use disorders.

3.3.5. Deliberate Drug Self-poisoning among Adolescents in Morocco

The analysis [27] of deliberate drug poisonings among adolescents in Morocco highlights the scale of the problem of suicide attempts among young people, underlining the importance of prevention and awareness-raising interventions to reduce suicidal behavior among this vulnerable population.

3.3.6. Screening for Unrecognized Bipolar Disorder in Outpatients with Recurrent Depressive Disorder: A Cross-sectional Study in a Psychiatric Hospital in Morocco

The study [28] on screening for unrecognized bipolar disorder in recurrent depressive patients highlights a significant prevalence of undiagnosed bipolar disorder among depressive patients, highlighting the importance of careful history and symptom assessment to improve patient diagnosis and management.

3.3.7. A Prospective 5-year Follow-up of Suicide Attempts in the Clinical Population of the Fez Region, Morocco

The prospective study [29] of suicide attempts in the

clinical population of the Fez region highlights a significant prevalence of recurrent suicide attempts, underscoring the importance of continuous monitoring and early intervention to reduce the risk of suicidal recurrence in patients with psychiatric disorders.

3.3.8. Study of Insight and Factors Influencing it in Schizophrenia and Bipolar Disorder in Moroccan Inpatient Population

The comparative analysis of insight and factors influencing schizophrenia and bipolar disorder in a Moroccan inpatient population highlights significant differences in the improvement of illness awareness and treatment needs between schizophrenic and bipolar patients. These results underline the importance of differentiated therapeutic approaches to improve insight and management of patients with these disorders. [30].

These studies underline the importance of an integrated approach to mental health and psychiatric disorders in Morocco, highlighting persistent challenges and needs in the prevention, screening, and management of mental disorders in the country.

3.4. Prevention and Intervention

In the field of mental health, prevention and intervention strategies play a crucial role in combating various psychological disorders and mitigating their harmful effects. This category encompasses diverse approaches to providing support, treatment, and resources to individuals facing mental health challenges. From technological innovations to clinical studies and therapeutic interventions, these efforts aim to improve the well-being of individuals and communities by proactively addressing mental health issues.

3.4.1. Towards the Development of a Pocket Therapist

An intelligent and adaptive psychological support chatbot against mental health disorders in a pandemic situation: This study [31] focuses on the development of an innovative chatbot using natural language processing and deep learning techniques to provide psychological support to individuals, especially students, suffering from mental health disorders exacerbated by the COVID-19 pandemic. By recognizing human emotions and offering personalized interventions, such as mood regulation and managing negative thoughts, the chatbot aims to relieve psychological distress and improve mental well-being.

3.4.2. Gamification-based Apps for PTSD

Feature and functionality analysis: Post-traumatic stress disorder (PTSD) is a debilitating mental health disorder that can significantly impair daily functioning and quality of life. This article [32] examines gamification-based mobile applications designed to help individuals manage and treat PTSD symptoms. By assessing the functionality and features of these apps, the study highlights opportunities to improve accessibility and effectiveness in the provision of mental health support to

people with PTSD.

3.4.3. Mobile Apps for PTSD. Expanding on the Previous Article, This Study Identifies and Evaluates Free Mobile Apps Available on the Android Platform for People with PTSD

By examining the functionalities of these apps, the research [33] aims to help PTSD app seekers find resources suitable for self-help, facilitating access to mental health interventions and improving overall well-being.

3.4.4. Machine Learning Algorithms and Semantic Sentiment Analysis for Suicidal Sentiment Prediction in Social Networks

Sentiment analysis in social networks represents a new challenge for identifying individuals at risk of suicidal ideation or behavior. This article [34] proposes machine learning algorithms and semantic sentiment analysis techniques to extract predictive information from Twitter data. By analyzing suicide-related sentiments, the study aims to contribute to early detection and intervention strategies for suicide prevention.

3.4.5. Epidemiological Aspects of Suicide Attempts among Moroccan Children

This study [35] explores the epidemiological features of suicide attempts among children in Morocco, highlighting the underlying factors and clinical manifestations associated with suicidal behavior in this population. By identifying potential risk factors and emphasizing the importance of early intervention and psychiatric care, the research aims to inform targeted prevention and treatment strategies to address suicidal behavior in children.

3.4.6. Do Reasons for a Living Protect Against Suicidal Thoughts and Behavior? A Systematic Review of the Literature

Few studies have examined protective factors against suicide. This systematic review [36] examines the role of reasons for living (RFL) in mitigating suicidal ideation and behavior. Synthesizing existing literature, the study highlights the potential of RFLs to moderate suicide risk factors and build resilience. The results argue in favor of therapeutic strategies aimed at strengthening RFLs to prevent suicidal thoughts and behaviors effectively.

3.4.7. Child Sexual Abuse: A Report of 311 Cases with a Review of the Literature

Addressing the widespread problem of child sexual abuse, this study [37] analyzes 311 cases to highlight epidemiological features and the negative impact on victims' well-being. Underlining the need for a multi-disciplinary approach to prevention and management, the research highlights the imperative of early intervention and support services to deal with the traumatic consequences of child sexual abuse.

3.4.8. Suicide Attempt by Bladder Self-stabilization, A Clinical Case Report

This case report [38] documents a unique case of a suicide attempt involving bladder self-stabilization, highlighting the complexities of diagnosing and treating such cases. By presenting clinical observations and management strategies, the report provides valuable insight into the challenges faced by healthcare professionals in treating self-inflicted injuries and psychiatric comorbidities.

In conclusion, the articles in the "Prevention and Intervention" category collectively contribute to advancing our understanding of mental health challenges and refining prevention and intervention strategies. From innovative technological solutions to clinical information and case studies, these contributions highlight the importance of early detection, support, and targeted interventions to promote mental well-being and prevent adverse mental health outcomes. By addressing the multifaceted aspects of mental health disorders, these contributions aim to empower individuals, healthcare professionals, and communities to tackle mental health problems and build resilience effectively.

3.5. Social and Cultural Factors

The social and cultural factors category explores the complex relationship between social norms, cultural practices, and mental health outcomes. Understanding how social structures, cultural beliefs, and interpersonal dynamics influence individuals' mental well-being is crucial to developing effective interventions and support systems. The articles selected in this category shed light on social and cultural influence on mental health in the Moroccan context.

3.5.1. Depressive Symptoms among Adolescents in Morocco: A Cross-sectional School-based Study

This study [39] examines depressive symptoms among adolescents in Morocco, highlighting social and cultural factors that may contribute to these symptoms. The results reveal a significant prevalence of depression among adolescents, with correlations between depressive symptoms and variables such as socio-economic level and family relationships. This highlights the importance of taking social and cultural factors into account in the assessment and management of depression among Moroccan adolescents.

3.5.2. Suicide Attempts among Women Receiving Psychiatric Treatment in the Eastern Region of Morocco

This study [40] explores suicide attempts among women receiving psychiatric treatment in the eastern area of Morocco, highlighting the social and cultural factors that may influence these suicidal behaviors. The results reveal correlations between suicide attempts and factors such as socioeconomic status, family relationships, and social pressures. This research highlights the importance of understanding and addressing the social and cultural

factors underlying suicidal behavior in Moroccan women.

3.5.3. Chronic Diseases among Medical Students in Morocco: What Interactions with Psychosocial Stress?

This article [41] examines chronic diseases among medical students in Morocco, focusing on the interactions between these diseases and psychosocial stress. The results highlight a notable prevalence of chronic diseases among medical students, with significant associations between psychosocial stress and the development of these diseases. This study highlights the importance of considering social and cultural factors, such as academic stress and social pressures, in preventing and managing chronic diseases among Moroccan medical students.

3.5.4. Role of Early Maladaptive Patterns and Alexithymia in the Relationship Between Perceived Parenting Styles Among Moroccan Substance Users

This research [42] explores the role of early maladaptive patterns and alexithymia in the relationship between perceived parenting styles and substance use in Morocco. The results reveal significant associations between early maladaptive patterns, alexithymia, and substance use, highlighting the importance of social and family factors in the prevention and management of addictive behaviors among Moroccan substance users.

3.5.5. Counseling and Psychotherapy in Morocco

This article [43] presents the story of T.M., a Moroccan patient who benefited from counseling and psychotherapy to treat his mental disorders. T.M.'s story highlights the importance of psychosocial support and therapy in the management of mental disorders, underlining the positive impact of social and culturally adapted interventions on the mental health of individuals in Morocco.

The studies reviewed in this category highlight the crucial importance of social and cultural factors in the mental health of individuals in Morocco. Understanding these social and cultural influences is essential to developing effective interventions and mental health policies adapted to the Moroccan population. By integrating a holistic perspective that considers social and cultural contexts, it is possible to address the mental health needs of individuals better and promote mental well-being in Moroccan society.

3.6. Innovative Technologies and Interventions

The articles selected for the innovative technologies and interventions category explore various innovative approaches to detecting, preventing, and managing mental health problems using emerging technologies.

3.6.1. Automated Detection and Analysis of Cyberbullying Behavior Using Machine Learning Algorithms

This research [44] proposes a novel approach to detect and analyze cyberbullying behavior using machine learning algorithms automatically. The results demons-

trate the effectiveness of this approach in the early identification of cyberbullying cases, offering a promising technological solution to combat this growing problem in a digital context.

3.6.2. Detecting Toxic Comments on Social Media Using Artificial Intelligence Techniques

This paper [45] explores using artificial intelligence techniques to detect poisonous remarks on social media. The results highlight the effectiveness of machine learning models in identifying potentially harmful comments, offering an innovative method for promoting a safer and healthier online environment.

3.6.3. Detecting Suicidal Ideation on Social Networks: A Short Literature Review

This literature [46] review examines existing approaches to detecting suicidal ideation on social networks. The results highlight the growing importance of automatic natural language analysis techniques and machine learning models for identifying early warning signals of suicidal behavior online, paving the way for innovative preventive and supportive interventions.

3.6.4. A Deep Learning Algorithm for the Prediction of Suicidal Ideation

This research [47] proposes a deep-learning algorithm to predict suicidal ideation from online data. The results show that this algorithm can accurately identify individuals at risk, offering a potentially valuable tool for mental health professionals to intervene in a proactive and targeted manner.

3.6.5. Second-generation Computational Modeling of Cardiac Electrophysiology

Potential response action to ionic concentration changes, and metabolic inhibition: This research [48] explores a novel computational modeling approach to studying cardiac physiology. The results provide valuable insights into the mechanisms underlying cardiac arrhythmias, paving the way for more precise interventions and treatments for patients with cardiac disorders.

Emerging technologies offer unprecedented opportunities to address mental health challenges. The research reviewed in this category demonstrates the effectiveness of innovative approaches such as machine learning and artificial intelligence in detecting, preventing, and managing mental health problems. By integrating these technologies into clinical practices and community interventions, it is possible to provide more personalized and effective care to promote mental and emotional well-being.

CONCLUSION

In conclusion, our comprehensive review of suicide research in Morocco has revealed crucial insights into the prevailing trends, risk factors, and preventive measures associated with suicidal behavior in the country. Through

a meticulous analysis of available literature, we have identified a significant prevalence of suicide, underscored by the complex interplay of mental health disorders, familial dynamics, and societal pressures. This highlights the urgent need for targeted interventions and robust policies to address this pressing public health issue. Moreover, our review has highlighted the emergence of innovative technological solutions, such as artificial intelligence and social media analysis, which promise to enhance suicide detection and prevention efforts.

The findings of this review carry substantial implications for mental health policies and practices in Morocco. By elucidating the multifactorial nature of suicidal behavior and its determinants, our study provides valuable guidance for policymakers, healthcare professionals, and stakeholders involved in suicide prevention initiatives. Furthermore, our identification of existing gaps in suicide research underscores the need for continued investigation and investment in this field. Despite significant strides, there remains a dearth of longitudinal studies and evidence-based interventions tailored to the Moroccan context. Addressing these gaps requires interdisciplinary collaborations and innovative methodologies to understand and mitigate the complex drivers of suicide comprehensively.

Moving forward, it is imperative to prioritize research efforts aimed at bridging these gaps and advancing suicide prevention strategies in Morocco. This fosters collaboration between researchers, mental health professionals, policymakers, and community stakeholders to develop contextually relevant and culturally sensitive interventions. Additionally, there is a need for increased awareness and destigmatization surrounding mental health issues and suicidal behavior, coupled with enhanced access to mental health services and support networks. By addressing these critical areas, we can strive towards reducing the burden of suicide and promoting mental well-being across Moroccan society.

LIST OF ABBREVIATIONS

WHO	=	World Health Organization
PTSD	=	Post-traumatic Stress Disorder
RFL	=	Role of Reasons For Living

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