Iran J Public Health, Vol. 54, No.2, Feb 2025, pp.346-360

Review Article

A Scientometric Perspective on Stigma Research in Medicine: A Bibliometric Review

Hossein Akbari, Mahla Mohammadi, Abolfazl Hosseini

Departments of Social Science, Faculty of Letters and Humanities, Ferdowsi University of Mashhad, Mashhad, Iran

***Corresponding Author:** Email: h-akbari@um.ac.ir

(Received 18 Aug 2024; accepted 25 Oct 2024)

Abstract

Background: Stigma is a critical social determinant of health, influencing individuals' access to resources, quality of life, and overall well-being. Despite its significant implications, bibliometric studies on stigma in the medical field remain sparse. We provide a comprehensive scientometric analysis of stigma research in medicine over the past 30 years, highlighting trends, key focus areas, and evolving challenges.

Methods: A bibliometric analysis was conducted using VOSviewer software, utilizing data from the Scopus database. The search included articles with the keyword "stigma*" in the title, published between 1992 and 2022, within the fields of Medicine, Nursing, and Professional Health. The initial search yielded 20,284 articles, narrowed down to 7,854 relevant publications for detailed analysis. Key metrics analyzed included co-authorship, co-occurrence of keywords, and co-citation patterns.

Results: The analysis revealed a significant increase in stigma-related publications in the medical field, particularly since 2010, with a peak in 2022, largely driven by the COVID-19 pandemic. The research identified nine major keyword clusters, 40 associated diseases, and 36 target groups. Persistent diseases like HIV, mental illness, addiction, and cancer continue to be strongly associated with stigma.

Conclusion: The findings underscore the evolving nature of stigma research in medicine, with an increasing focus on intersecting stigmas and their persistent impact on public health. Future research should aim to develop comprehensive models and strategies to manage and reduce stigma, particularly for diseases with enduring stigmatic associations. Collaborative efforts among policymakers, healthcare providers, and society are crucial to address the social and economic consequences of stigma and improve health outcomes.

Keywords: Bibliometric analysis; Stigma; VOSviewer

Introduction

The segregation of individuals based on specific characteristics has a long history in human societies (1). Similar to ancient Greece, certain social groups were separated from others through physical marks on their skin (2). In 1963, Goffman introduced the concept of stigma, which encompasses the stigmatization of identity and negative social attributes (2). As a devalued attribute, stigma arises from the evaluations that actors make of each other during social interactions (3). In this evaluative process, actors identify each other's characteristics and attach negative labels to

Copyright © 2025 Akbari et al. Published by Tehran University of Medical Sciences.
This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license.
(https://creativecommons.org/licenses/by-nc/4.0/). Non-commercial uses of the work are permitted, provided the original work is properly cited.
DOI: 10.18502/ijph.v54i2.17905

traits that deviate from the social value structure (4). Negative labels, combined with negative stereotypes, segregation, reduced social status, and discrimination, contribute to the development of stigma (5). Therefore, stigma can be seen as a process that involves three stages: labeling, responding, and consequences (6), with social actors assuming two roles in this process: the first group comprises actors who assign negative labels to individuals with different characteristics (acting as stigmatizers), and the second group, in the position of the stigmatized, employs strategies to cope with stigma, manage their identity, and deal with the consequences of stigma (6).

Exploitation, value contradiction, and the desire to avoid disease, risk, or threat are the three main reasons for the perpetuation of stigma (7, 8), resulting in various economic, social, and physical consequences for individuals. Stigma can significantly impact individuals' social, emotional, and physical well-being and hinder their access to employment, education, housing, and cause communication isolation (9, 10). These limitations disrupt the process of social and economic integration, leading to social disparities and societal health issues (6, 11), and become significant determinants of disease and mortality at the population level (10). Therefore, stigma can be considered a social determinant of health (10, 12), meaning that the social infrastructure, economic, political, social, and cultural structures associated with stigma influence individuals' health status (12).

The significance of this concept, particularly in terms of its consequences, has resulted in numerous studies across various fields and subjects. These studies encompass research on individuals with mental disorders (13), HIV(14, 15), coronavirus (16), leprosy (17), obesity(18), drug users(19), individuals experiencing economic poverty (20), residents of informal settlements (21), and others. Therefore, although stigma is rooted in social sciences, extensive research has been conducted on it in other fields, particularly medicine. Today, it stands as one of the primary areas of investigation in psychology, medicine, health, and healthcare. In fact, a significant percentage of English-language articles with the keyword "stigma" in the title pertain to the medical field, as well as social sciences, psychology, nursing, and other fields (Scopus, 2023). Various studies have frequently employed this concept to reference diseases and physical deviations in individuals (22). The significance of this concept in medicine is such that it is regarded as a "hidden burden of disease" (WHO) and a threat to both the physical and social well-being of individuals and society (23).

Considering the abundance of publications in this domain and the significant economic, social, and physical implications linked to stigma, there exists a pressing need for a bibliographic review that offers a comprehensive summary of the literature in this particular area. Bibliometric analysis, pioneered by Alan Pritchard in 1969, provides the means to scrutinize the overall landscape of literature within a specific field, encompassing recent global trends across relevant disciplines. Despite stigma being a sociological concept, bibliometric studies have predominantly bypassed it, unlike the substantial volumes of bibliographic research observed in social sciences, environmental studies, and energy sciences. This is noteworthy given the existence of extensive studies on various diseases and related conditions, with only a handful of studies explicitly focusing on bibliometrics of stigma. One such significant study (24) delved into the stigma bibliometrics spanning from 1998 to 2018. They highlighted meta-analysis and internalized stigma as key focal points and noted an uptick in research on HIV stigma and obesity.

The current investigation seeks to delve into publication patterns within the medical field over a span of 30 years. Utilizing bibliometric analysis, the aim was to gain a more comprehensive understanding of the concept of stigma and its evolution over time.

Methods

VOSviewer (https://www.vosviewer.com/), a scientometric software, can utilize data from five databases, namely Web of Science, Scopus, Di-

mensions, Lens, and PubMed from 1992 to 2022, to generate outputs based on article content, such as keywords, publications, researchers, and countries. It has the ability to visually display the relationships between nodes and clusters, allowing for the creation of a scientific map (25). As one of the largest global databases with comprehensive research coverage, the Scopus database serves as an efficient source for bibliometric studies (26). Therefore, the articles analyzed in this research were retrieved from the Scopus database.

"On Mar 11, 2023", an online literature search was conducted, focusing on the keyword "stigma*" in the title. The asterisk (*) was used to include related words in the search results. This initial search resulted in 20,284 articles. Among these 55.3 were found to be relevant to the field of medicine. Considering the significant number of stigma-related literature in the medical field and the importance of this concept within that domain, the search process was narrowed down to three specific areas: Medicine, Nursing, and Professional Health. Additional restrictions were applied to refine the analysis further. Consequently, only articles published in journals within a 30-year timeframe, from 1992 to 2022[1], were included in the study.

The refined search yielded 8,101 articles, obtained in SCV format for analysis using VOSviewer software. To ensure validity, two researchers reviewed the mentioned items, including the titles and abstracts of each article. Based on this review, 247 articles that used the concept of stigma outside of our intended context were excluded from the analysis. Consequently, 7,854 articles remained for further analysis[2]. VOSviewer[3] version 1.6.18 was employed to analyze co-authorship and co-occurrence. The search process in Scopus applied the following filters:
TITLE (stigma*) AND PUBYEAR>1992 AND PUBYEAR < 2022 AND (LIMIT TO (SUBJAREA, "MEDI") OR LIMIT-TO (SUBJAREA, "NURS") OR LIMIT-TO (SUBJAREA, "HEAL")) AND (LIMIT-TO(DOCTYPE, "ar"[4])) AND (LIMIT-TO(SRCTYPE, "j"[5]))

Results

Publication Growth Trend

The descriptions and data about the publication growth in the realm of stigma are intriguing. According to the Scopus database, publications focusing on stigma in the medical field date back to 1871. From 1995 to 2009, the annual publication count remained below 200 articles. However, starting in 2010, the number exceeded 200 articles per year, signifying a significant upsurge in annual publications. The year 2022 recorded the highest number of publications, totaling 1,203 articles (Fig. 1). This exponential surge appears closely tied to the global impact of the Covid-19 pandemic, reflecting an intensified focus on stigma across various disciplines within the medical realm. The upward trend in the publication of stigma-related articles (Fig. 1), signifies that stigma has gained widespread prevalence as a social issue. This prevalence means that any phenomenon incorporating negative attributes can subject individuals to stigma, imposing multiple consequences on their lives and potentially affecting both their social and physical well-being. This multifaceted nature of the concept has consequently drawn increasing attention from researchers in this field.

[1] Because we wanted to examine the research of the last 3 decades

[2] Of the 7,854 articles, 392 were related to the validation, psychometrics, adaptation, and scaling of the stigma questionnaire. The researcher conducted a separate examination of these articles. Among them, 24.5 percent were focused on HIV/AIDS, followed by mental illnesses, cancers, and epilepsy in subsequent ranks. The significant number of articles in this field can be attributed to the significance of stigma in the medical field, the demand for reliable scales in these domains, and the intricate nature of the concept of disease stigma, which necessitates thorough evaluation.

[3] VOSviewer was developed by the Centre for Science and Technology Studies (CWTS) at Leiden University, Netherlands

[4] Document type: Article

[5] Source type: Journal

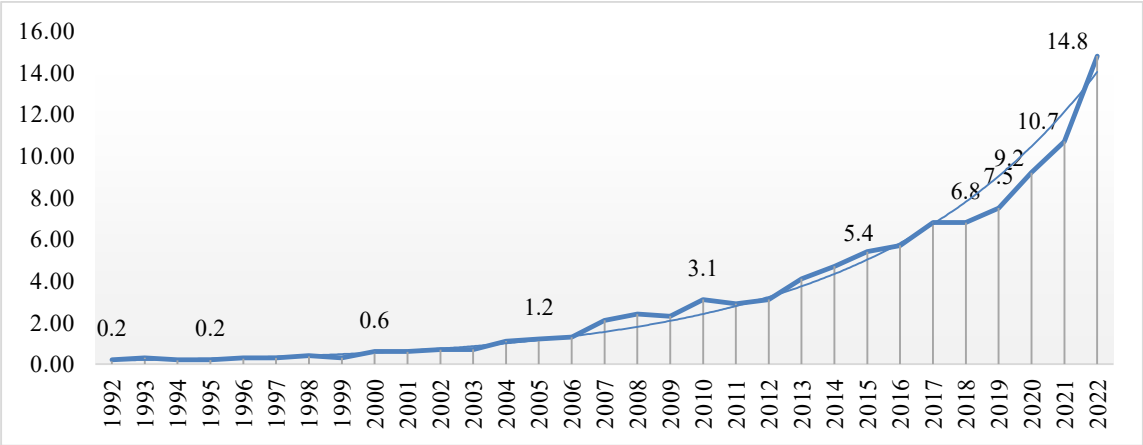

Fig. 1: Growth trend of the publications on stigma

Subject Area Analysis

Stigma, originally a sociological concept, has garnered significant research attention in the medical and psychological fields. In fact, the majority of publications on stigma are within the realm of medicine with 55.3%. Psychology and social sciences, on the other hand, are also ranked next with 12.4% and 9.9% respectively. This observation underscores the importance of sociology within the medical domain.

Word Cloud

The word cloud displayed in Fig. 2(A) comprises 105 keywords, with larger font sizes indicating higher frequencies. Prominent keywords, including HIV, mental health, discrimination, mental illness, and self-care, exhibit the highest occurrences.

Bibliometric Analysis of Co-Occurring Keywords

Initially, there were 8,758 author keywords. Following the implementation of a minimum occurrence criterion of 10 instances for each keyword (adjusted as desired, as suggested by Effendi (27), and subsequent examination, a total of 207 keywords were identified. These keywords were then organized into 9 distinct clusters, as depicted in Fig. 2(B) (Table 1). The size of nodes in the Figure reflects the frequency of occurrence. Curves connecting the nodes illustrate the co-occurrence of keywords within the same publications. The proximity of nodes indicates a higher frequency of co-occurrences between the associated keywords. These 9 clusters can also be divided into two basic clusters. The first cluster includes diseases with a focus on HIV, mental illness, obesity, depression, epilepsy, and the second cluster includes related concepts of disease stigma, such as public stigma, self-image, social support, and stigmatization, all of which show the importance of combining these keywords in disease stigma studies.

Concepts within the first cluster that is centered on HIV; It revolves around the stigma associated with sexually transmitted infections (STIs). These concepts highlight the importance of sexual health and physical well-being among diverse groups of individuals. Individuals such as homosexuals, transgender individuals, LGBT community members, sex workers, and others who are particularly affected by STIs are simultaneously impacted by these diseases. The stigmatization of contagious and gender-related diseases such as HIV, mutual relationships, transgender issues, and general sexual health is often rooted in cultural barriers within societies. This creates a three-stage challenge in the diagnosis, initiation of treatment, and treatment follow-up (28). Consequently, many diseases that could be treated earlier and at lower costs or prevented from spreading further fall into neglect. This negligence imposes substantial costs on healthcare systems, the economy, and the social fabric of a

country, leading individuals to confront a sense of imminent and premature mortality (29), which has a direct effect on reducing the quality of people's lives.

The second cluster focuses on mental health, discrimination, and stigma linked to mental illness. Research underscores that stigma and discrimination surrounding mental health issues pose a significant challenge in various societies, labeling these conditions as threats to public health due to misconceptions like them being dangerous and unpredictable (22). Negative attitudes and discrimination against those seeking mental health support create barriers to effectively managing these issues. Media portrayal exacerbates misconceptions, influencing public perceptions about mental health conditions (24). Additionally, legalizing stigma through media could further restrict individuals (20). Educating medical and nursing students, as well as healthcare providers, is crucial in reducing social discrimination, as education is recognized as a key strategy to combat stigma Raising awareness, especially among institutional actors (11), significantly enhances attitudes towards mental health and aids in reducing stigma. Therefore, the imperative identification and categorization of target groups based on their interaction levels with patients remain crucial in mitigating these biases.

Concepts within third cluster revolve around issues of obesity and abortion. These concepts can be inferred as factors affecting individual health, such as obesity-related challenges, overweight issues, abortion-related problems, and eating disorders. The importance of cultural influences, media, living environment and health care policies in this context can be identified. One of the reasons for the stigma associated with people who have abortions is the perceived risk to women's physical health and the immorality of such practices (30), while for obese people, being known as lazy, ugly and awkward (31). Stigma forces people to resort to coping strategies. For example, the discrepancy between one's body and the ideal body image promoted in society leads many to take measures to reach the desired weight and incur significant costs, which not only have no positive consequences for It is not accompanied, but also leads to physical damage. Many organizations exploit individuals striving to reduce stigma, which further exacerbates the situation (2).

The fourth cluster, public stigma surrounding substance use and addiction poses significant barriers to recovery and effective treatment, especially in primary care settings. Issues such as opioid use disorder, substance use disorder, and substance abuse contribute to this stigma, often intertwined with biases against individuals facing these challenges. This stigma further complicates advocacy efforts and the provision of adequate care for conditions like AIDS, hepatitis C, and HIV, particularly among people who inject drugs. Addressing substance use disorders, alcohol use disorder, and the complexities of injection drug use in primary health care becomes pivotal, especially in developing countries where these issues are prevalent and demand urgent attention.

In the fifth cluster, self-image or internalized stigma affects people's self-esteem, coping mechanisms, and resilience, especially among people dealing with conditions such as bipolar disorder and serious mental illnesses. This internal stigma often leads to psychological distress, feelings of loneliness, and increased social anxiety (32), and in the absence of stigma factors, a person still has a strong perception of stigma (33). In combating this, community support and empowerment plays an important role, fostering hope and increasing psychological well-being. For people living with HIV (PLHIV) who face stigma, resistance efforts are essential to improve mental health outcomes. Healthcare professionals and psychiatric nursing interventions can significantly help combat self-stigma through peer support initiatives, ultimately reducing suicide rates and promoting mental health resilience in disadvantaged communities.

Social support within cluster six, associated with terms such as disclosure, family, quality of life, employment, coping strategies, family stigma, and stigma management, can create two different conditions for an individual depending on its presence or absence. In certain situations, social support, particularly from official organizations,

is structured in a way that not only provides support but also exposes individuals to stigma upon receiving it (34). Therefore, it is crucial that social support from official entities is devoid of stigmatization. Furthermore, families can play dual roles in support and lack thereof; lack of support from the family can subject individuals to a sense of shame and confirmation from the closest members of their network (14), resulting in more adverse consequences. On the other hand, seeking social support is considered one of the strategies to combat stigma (35), serving as a catalyst for social integration and enhancing quality of life (36).

The seventh cluster, depression and anxiety often intersect with chronic diseasees like cancer, diabetes mellitus, and psoriasis, affecting the quality of life for individuals. Nursing interventions play a pivotal role in addressing the anticipated stigma, shame, and blame associated with conditions such as lung cancer, breast cancer, and the challenges linked to survivors' experiences. The emotional stress related to these diseases, especially in women's health issues, can influence body image and exacerbate feelings of shame. Additionally, the association between smoking and lung cancer further amplifies anticipated stigma, emphasizing the need for holistic support to mitigate these interconnected issues and enhance the well-being of those grappling with chronic conditions.

Cluster eight refer to the COVID-19 pandemic that has brought to light the issue of stigmatization in public health, reminiscent of past instances seen with diseases like tuberculosis and leprosy. So that in the past, even the passage of people with tuberculosis or cholera in the city was monitored (1). Health-related stigma, fueled by fear and exacerbated by social media platforms, affects not only those diagnosed with the coronavirus but also healthcare workers and nurses on the front lines. This stigma can lead to social exclusion, isolation, and the perpetuation of fear, mirroring the historical societal responses to diseases. Addressing this stigma is crucial to fostering a supportive environment and preventing similar patterns of discrimination. Therefore, the stigma regarding diseases is timeless and the media play an influential role in the formation of perceptions, stereotypes and prejudices towards patients (20).

The ninth cluster refers to adolescents and children with various diseases such as epilepsy epilepsy often face various forms of stigma, including perceived, enacted, and felt stigma. This stigma affects not only the child but also parents and students within their social circles; Because stigma has a diffuse nature and penetrates the people who interact with the sick person (2). Personal stigma surrounding seizures and perceived social support affect their daily lives and have adverse personal consequences (32).

Network Map of Trending Topics

In Fig. 2(C) popular topics from 2012 to 2022 based on authors' keywords are drawn by the network map software. The publication timeline is represented by purple, while the yellow color indicates the most recent topics. The size of the circles reflects the frequency of the words, and the distance between the circles indicates their correlation.

The trend of studies from 2012 to 2021 indicates that most recent research has focused on topics such as intersectional stigma, COVID-19, substance use disorder, alcohol use disorder, and diabetes. One notable subject that has gained significant attention recently is intersectional stigma, which involves the combination of multiple negative attributes resulting in stigma.

The keyword analysis of articles demonstrates a shift in focus from predominantly seizure-related studies in 2012 to a diverse array of subjects such as empowerment, discrimination, mental disorders, sexual diseases, substance abuse, epilepsy, Alzheimer's, obesity, autism, infertility, abortion, cancer, COVID-19, consequences, and a wide spectrum of different groups in the stigma discourse through 2021.

Table 1: Clusters and keywords

Cluster	Keywords	Frequency
Cluster 1	**Hiv**. **Men who have sex with men**. **Msm**. **Youth**. **Intersectionality**. Transgender. Depressive symptoms. Race. Identity. Hiv prevention. People living with HIV. Health disparities. Sex work. Violence. Gay. Healthcare. African Americans. Drug use. Gay men. Structural stigma. Pre-exposure prophylaxis. Bisexual. Older adults. Immigrants. Transgender women. Homophobia. Suicidal ideation. Sexual health. Lesbian. Intersectional stigma. Social networks. Sexual stigma. Female sex workers. Lgbt. Migrants. Gay and bisexual men. Chronic pain. Resistance.	38
Cluster 2	**Mental health**. **Discrimination**. **Mental illness**. **Social distance**. **Help-seeking**. Prejudice. Mental disorders. Intervention. Suicide. Stereotypes. Mental health stigma. Mental illness stigma. Caregivers. Contact. Medical students. College students. Stigma reduction. Social discrimination. Stigma and discrimination. Medication adherence. Intellectual disability. Nursing students. Labeling. University students. Healthcare providers. Chinese. Patients. Burden. Men. Mental health professionals. Psychiatrists. Borderline personality disorder. Mass media. Socioeconomic status. Obsessive-compulsive disorder. Mental health care. Service users.	37
Cluster 3	**Obesity**. **Weight stigma**. **Culture**. **Pregnancy**. **Abortion**. Prevention. Health care. Media. Health. Communication. Eating disorders. Well-being. Overweight. Mental health services. Human rights. Health professionals. Health promotion. Poverty. Weight. Reproductive health. Counseling. Internet. Self-compassion. Psychiatric stigma.	24
Cluster 4	**Public Stigma**. **Substance use**. **Recovery**. **Addiction**. **Primary care**. Treatment. Opioid use disorder. Substance use disorder. Opioids. Acquired immunodeficiency syndrome. Substance abuse. Bias. Advocacy. Substance use disorders. Hepatitis c. Barriers. Human immunodeficiency virus. Injection drug use. Developing countries. People who inject drugs. Alcohol use disorder. Primary health care.	22
Cluster 5	**Self-stigma**. **Internalized stigma**. **Self-esteem**. **Coping**. **Resilience**. Bipolar disorder. Psychological distress. Community. Empowerment. Serious mental illness. Hope. Plhiv. Stigma resistance. Healthcare professionals. Peer support. Loneliness. Suicidality. Psychological well-being. Psychiatric nursing. Social anxiety.	20
Cluster 6	**Social support**. **Disclosure**. **Women**. **Disability**. **Family**. Dementia. Health-related quality of life. Employment. Aging. Autism. Infertility. Family caregivers. Coping strategies. Support. Alzheimer's disease. Family stigma. Stigma management. Psychiatric disorders. Multiple sclerosis.	19
Cluster 7	**Depression**. **Quality of life**. **Anxiety**. **Nursing**. **Cancer**. Stress. Shame. Lung cancer. Smoking. Psoriasis. Chronic illness. Anticipated stigma. Body image. Breast cancer. Blame. Women's health. Diabetes mellitus. Survivors.	18
Cluster 8	**Stigmatization**. **covid-19**. **Tuberculosis**. **Public health**. **Leprosy**. Social media. Healthcare workers. Nurses. Fear. Coronavirus. Twitter. Health-related stigma. Social exclusion. Pandemic. Isolation. Diabetes.	16
Cluster 9	**Epilepsy**. **Adolescents**. **Perceived stigma**. **Children**. **Parents**. Students. Enacted stigma. Felt stigma. Personal stigma. Child. Perceived social support. Seizures. Hiv disclosure.	13

The emerging intersecting stigma trend since 2019 indicates the creation of a kind of amplification in portraying multiple negative attributes, leading individuals to face intersecting stigmas (37). The advancement of science has not only helped control this complex phenomenon but has also shaped numerous layers of stigma. Additionally, structural stigma (37) reveals that recently, the role of structures and macro-level policies has been more sustainable in impacting stigma enactment and its reduction and management compared to individual actions. Therefore, structures, as providers of resources and constraints, can offer sustained interventions to counter stigma for the benefit of patients.

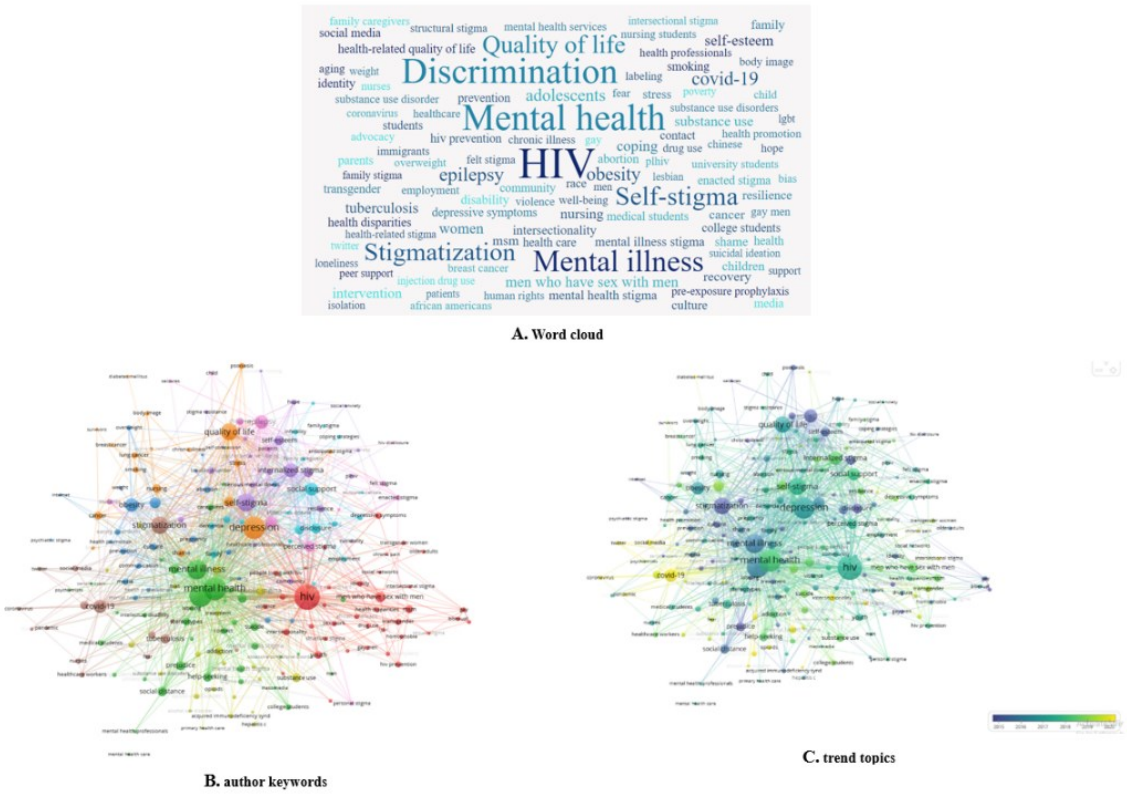

Fig. 2: Word cloud, author keywords, trend topics

Target Diseases

According to Table 2, one of the most important findings from among the articles reviewed in this research is the identification of 40 different diseases that are targeted in relation to stigma. HIV, mental illness, schizophrenia, obesity, and addiction have the highest prevalence. This broad spectrum indicates the connection between the concept of stigma and a wide range of diseases, highlighting how stigmatization affects various health conditions in societies.

Target Groups

Another significant discovery within these articles is the identification of 36 specific groups involved in stigma, playing dual roles as both perpetrators and recipients of stigmatization. The groups most frequently mentioned include healthcare professionals (such as doctors, nurses, and specialists), adolescents, young people, men in same-sex relationships, individuals living with HIV, and women. Therefore, we can acknowledge these individuals' extensive role in the stigma realm.

Classification of target diseases of stigma

Table 3 categorizes stigmatized diseases and identifies which disease categories are more often the target of stigma studies. Infectious and viral diseases accounted for the largest number of patients with 1557 cases. This category includes HIV, Covid-19, tuberculosis, hepatitis C and B, leprosy, sexually transmitted infections, and SARS-CoV-2. This high number reflects the widespread stigma associated with these conditions, likely due to concerns about transmission, treatment challenges, and their impact on public health.

Table 2: Diseases, people, and study target groups

N	Disease	R	Target group	N
1577	Hiv (Human Immunodeficiency Virus, Acquired immunodeficiency syndrome)	1	People in the treatment field	258
690	Mental illness	2	Adolescents	158
370	Schizophrenia	3	Men who have sex with men	153
310	Obesity	4	Youth	89
286	Addiction	5	Plhiv	89
168	Covid-19	6	Women	87
164	Epilepsy	7	Parents	70
93	Lgbt (Transgender, Bisexual, Lesbian)	8	Families	61
82	Tuberculosis	9	College students	49
80	Suicidality	10	Children	48
64	Cancer	11	Gay and bisexual men	45
52	Abortion	12	Students	38
48	Leprosy	13	Medical students	33
45	Autism	14	African Americans	28
44	Dementia	15	Nursing students	19
40	Lung cancer	16	Chinese	18
38	Diabetes (Type 1,2)	17	Bisexual	17
32	Psoriasis	18	Child	17
31	Chronic illness	19	Immigrants	17
31	Hepatitis c, b	20	Older adults	17
26	Infertility	21	Transgender women	16
23	Intellectual disability	22	Patients	14
20	Alcohol use disorder	23	Female sex workers	13
20	Alzheimer's disease	24	Men	13
17	Breast cancer	25	Migrants	12
11	Multiple sclerosis	26	People who inject drugs	11
11	Seizures	27	Psychiatrists	11
11	sexually transmitted infections	28	Asian Americans	9
10	Obsessive-compulsive disorder	29	Refugees	16
9	Stroke	30	Teachers	9
8	Inflammatory bowel disease	31	Mothers	7
8	Infectious disease	32	African American women	8
8	Sickle cell disease	33	Black women	7
8	Stuttering	34	Muslim	6
7	Cervical cancer	35	Transgender persons	6
6	Head and neck cancer	36	Asian men	5
6	Prostate cancer	37	-	
6	sars-cov-2	38		
5	Asthma	39		
5	Irritable bowel syndrome	40		

Infectious and Viral Diseases

This category includes diseases caused by pathogens transmitted from person to person. The high number indicates that infectious and viral diseases are highly stigmatized, likely due to fear of contagion, complexities of treatment, and social consequences. The presence of both general and specific infectious diseases in this category highlights a broad range of conditions with significant public health impacts.

Neurological and Psychiatric Disorders

This category includes long-term health conditions. The lower number compared to infectious and psychiatric disorders suggests these condi-

tions may face less stigma overall. However, stigma related to chronic conditions can still be significant due to issues such as lifestyle factors, visible symptoms, and ongoing medical management.

Chronic and Non-Infectious Diseases

This category includes long-term health conditions that are not caused by infectious agents. The lower number compared to infectious and psychiatric disorders suggests these conditions may face less stigma overall. However, the stigma related to chronic conditions can still be significant due to issues such as lifestyle factors, visible symptoms, and the ongoing need for medical management.

Addiction and Substance Use Disorders

This category deals with conditions related to substance use. The stigma associated with addiction and substance use disorders is significant, and often linked to societal judgments about behavior and personal responsibility. The impact of addiction on individuals and their families contributes to this stigma.

Cancer

Cancer, including various specific types, is categorized separately. The relatively lower count might reflect both increased awareness and advancements in treatment. Despite this, cancer still carries stigma, often associated with fear, societal perceptions of severity, and the emotional and financial burden of the disease.

Gender and Sexual Orientation Issues

The stigma in this category is associated with social and cultural identities rather than medical conditions. The presence of stigma reflects ongoing societal challenges regarding acceptance and equal rights for different sexual orientations and gender identities.

Reproductive and Hormonal Conditions

This category includes conditions related to reproductive health and hormonal issues. Although less prevalent, these conditions can still face stigma due to cultural, social, and personal beliefs surrounding reproduction and related health issues.

Co-authorship Organizations

In the publication of stigma articles, 21,283 organizations are involved. By applying a minimum frequency criterion of 5 articles per organization (based on the software default), we identified a total of 197 organizations. Fig. 3(A) illustrates 148 organizations that are categorized into 15 clusters with the highest interconnections.

Harvard Medical School and the Illinois Institute of Technology have the highest number of articles. The primary research partner of Harvard Medical School is the Mbarara University of Science and Technology in Uganda. The Illinois Institute of Technology collaborates with the Department of Psychiatry at the University of Ulm and BKH of Ganzberg in Germany and the Department of Psychiatry at the University of Giesfeld in Germany.

Co-authorship Countries

In total, research on stigma has been published by 297 countries. Considering a minimum of 5 articles per country (based on the software default), we identified 98 countries, categorized into 8 clusters as shown in Fig. 3(B). The central countries in each cluster (i.e., countries with the highest number of publications) are as follows: the United States, the United Kingdom, Australia, Brazil, Iran, Turkey, Canada, and Kenya. The United States has the highest number of publications, with 3,296 articles, followed by the United Kingdom, with 816 articles. The United States collaborates with 108 countries, resulting in a total link strength of 1,803. China and the United Kingdom serve as the main research partners of the United States.

Table 3: Classification of target diseases of stigma

category	Disease	N
Infectious and Viral Diseases	HIV (Human Immunodeficiency Virus, Acquired immunodeficiency syndrome) Covid-19 Tuberculosis Hepatitis C, B Leprosy Sexually transmitted infections SARS-CoV-2 Infectious disease	1577
Neurological and Psychiatric Disorders	Mental illness Schizophrenia Epilepsy Dementia Alzheimer's disease Obsessive-compulsive disorder Suicidality Intellectual disability Stuttering Seizures Autism Stroke	1430
Chronic and Non-Infectious Diseases	Obesity Diabetes (Type 1,2) Chronic illness Psoriasis Inflammatory bowel disease Irritable bowel syndrome Asthma Multiple sclerosis Sickle cell disease	448
Addiction and Substance Use Disorders	Addiction Alcohol use disorder	306
Cancer	Cancer Lung cancer Breast cancer Cervical cancer Head and neck cancer Prostate cancer	140
Gender and Sexual Orientation Issues	LGBT (Transgender, Bisexual, Lesbian)	93
Reproductive and Hormonal Conditions	Infertility Abortion	78

Co-citation and cited references

Of the 245,335 referenced works, 322 were identified with a minimum of 20 citations (based on the software default) and classified into 6 clusters in Fig. 3(C). The common citation patterns within these clusters are as follows:

The first, second, and third clusters revolve around the centrality of "Conceptualizing stigma" by Link, B.G. and Phelan, J.C. In these clusters, it

analyzes the stigma of mental illnesses and its psychological and social consequences such as discrimination, how these consequences affect people in the face of mental health issues, strategies aimed at reducing adversity, and issues such as social acceptance, internalized stigma, and self-stigma.

The fourth cluster centers on "Measuring stigma in people with HIV: psychometric assessment of the HIV stigma scale" by Berger, B.E., Ferrans, C.E., and Lashley, F.R. The main studies in this cluster revolve around health inequalities, interventions, and strategies aimed at reducing stigma for individuals living with HIV.

The fifth cluster highlights the significance of "On stigma: notes on the management of spoiled identity" by Goffman. It focuses on individuals living with HIV and the LGBT community. These articles delve into the issues of discrimination and the adverse effects of HIV stigma, offering practical strategies to combat discrimination for these groups within society.

The sixth cluster focuses on "The social psychology of stigma" by Major, B. and M'brien, L.T. as a central piece of reference. Most studies within this cluster examine obesity and various approaches to addressing the associated stigma. These articles explore the impact of stigma on the well-being of individuals with obesity and propose strategies for its negative effects.

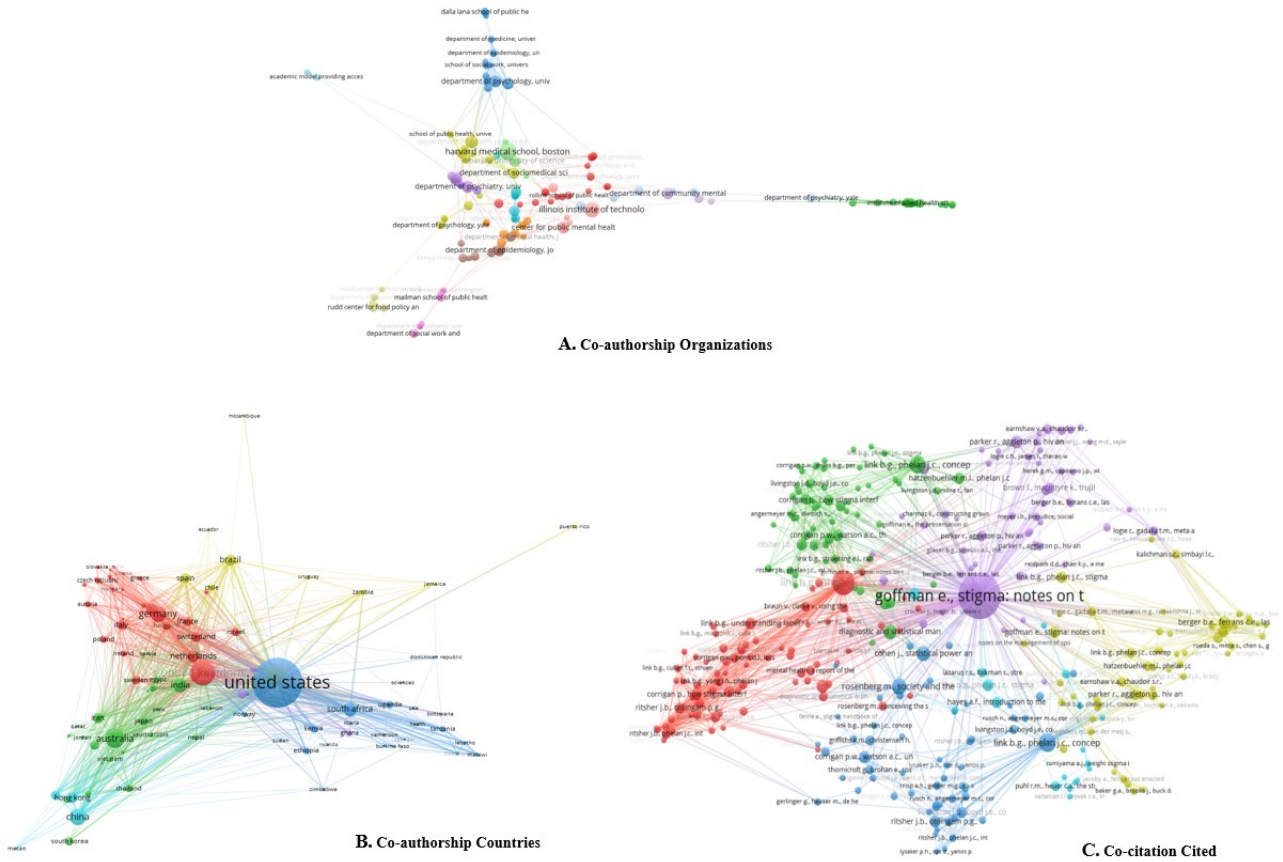

Fig. 3: Co-authorship Organizations, Co-authorship Countries, Co-citation Cited

Discussion

This study analyzed 7,854 articles from the Scopus database (1992–2022). A bibliometric analysis using VOSviewer examined co-occurrence, co-authorship, and co-citation patterns. Nine keyword clusters and forty-two identified diseases offer a comprehensive view of stigma research. Recent studies focus on Covid-19, substance use disorders, and diabetes, reflecting public attention shifts. As disease spread wanes, associated stigma diminishes, but persistent diseases like HIV, mental illness, addiction, and cancer retain their stigma, necessitating continued focus. While extensive research exists, future studies should develop models and strategies to manage and reduce stigma, addressing persistent diseases, target groups, and emerging trends.

The significance of proposing solutions can be seen in several aspects: a) Identifying 40 diseases and 36 target groups in the stigma process; b) The trend of recent articles focusing on intersecting stigmas, showing that this issue persists and has even intensified; c) The extension of stigma to the communication network of the stigmatized person (2); and d) The numerous consequences for individuals, as social stigma can exacerbate the initial harm caused by the disease (38). The simultaneous occurrence of the disease's physical consequences and the social and economic impacts of stigma, especially in those facing intersecting stigma, requires substantial costs and resources for treatment. This issue is further highlighted when these individuals are restricted from accessing resources and opportunities to improve their situation. Addressing the social and economic consequences beyond medical science must be done within society's framework, considering the role of others as stigmatizers. Therefore, presenting a solution could benefit from such a model:

Stigma is a constraining structural element within the culture of societies that limits individuals' access to resources in various social positions. Patients are individuals whose stigma prevents them from accessing resources and opportunities for a fair and standard quality of life within society, especially patients experiencing intersecting stigmas, that leads them to be in the triangle of stigma, inequality, and injustice. This process reproduces the cycle of stigma and breaking out of this necessitates the Power of agency to actively strive to change or reconstruct the existing structure. Among these groups, there is The Institutional other and The Macro other that can play a leadership role in bringing about change. The Macro other with a focus on media and the Institutional other with a focus on healthcare service providers, by presenting a realistic portrayal of patients and diseases, they disrupt imagined perceptions and create grounds for change in policies and structural rules. This serves as a catalyst for altering individuals' perceptions and breaking down structural limitations. Therefore, the combined Institutional other and Macro other along with the supportive role of families as the significant other, can disrupt the arrangement of stigmatizers structures (11, 39).

Conclusion

The increase in publications on stigma highlights its growing recognition as a significant social issue impacting both social and physical well-being. Addressing the social and economic consequences of stigma requires considering the role of stigmatizers within society. Findings show a shift in stigma research in medicine, with more focus on intersectional stigmas and their ongoing public health impact. Future research should develop comprehensive models and strategies to manage and reduce stigma, especially for diseases with persistent stigma. Collaborative efforts among policymakers, healthcare providers, and the community are essential for addressing the social and economic impacts of stigma and improving health outcomes.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or

falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

There was no specific funding for this study.

Conflict of interest

The author declares that there is no conflict of interest.

References

1. Fischer LS, Mansergh G, Lynch J, Santibanez S (2019). Addressing disease-related stigma during infectious disease outbreaks. *Disaster Med Public Health Prep,* 13 (5-6):989-994.
2. Goffman E (2009). *Stigma: Notes on the management of spoiled identity*. ed. Simon and schuster.
3. Jacobsson L (2002). The roots of stigmatization. *World Psychiatry,* 1 (1):25.
4. Becker HS (1963). *Outsiders*. ed. Free Press New York.
5. Link BG, Phelan JC (2001). Conceptualizing stigma. *Annu Rev Sociol,* 27 (1):363-385.
6. Mohammadi M, AKBARI H, Fouladiyan M (2022). Stigma; A systematic review of studies conducted in Iran. *Iranian J Sociology,* 23 (1):98-130.
7. Tyler I, Slater T (2018) Rethinking the sociology of stigma. Sage publications Sage UK: London, England, pp. 721-743.
8. Link BG, Phelan JC (2013). Labeling and stigma. *Handbook of the sociology of mental health,* 525-541.
9. Link BG, Struening EL, Rahav M, Phelan JC, Nuttbrock L (1997). On stigma and its consequences: evidence from a longitudinal study of men with dual diagnoses of mental illness and substance abuse. *J Health Soc Behav*, 38(2):177-90.
10. Hatzenbuehler ML, Phelan JC, Link BG (2013). Stigma as a fundamental cause of population health inequalities. *Am J Public Health,* 103 (5):813-821.
11. Akbari H, Mohammadi M, Hosseini A (2023). Disease-Related Stigma, Stigmatizers, Causes, and Consequences: A Systematic Review. *Iran J Public Health,* 52 (10):2042-2054.
12. Rivera-Segarra E, Ramos-Pibernus A (2013). Stigma as a social determinant of health: A fundamental cause theory perspective. *Soc Inclus Interdisc Interv,* 1027-1030.
13. Østerud KL (2023). Mental illness stigma and employer evaluation in hiring: Stereotypes , discrimination and the role of experience. *Sociol Health Illn,* 45 (1):90-108.
14. Akbari H, Safari S (2020). Conditions of experienced stigma in people living with HIV in Iran: a qualitative comparative analysis. *Sociol Health Illn,* 42 (5): 1060-1076.
15. Viljoen L, Bond VA, Reynolds LJ, et al (2021). Universal HIV testing and treatment and HIV stigma reduction: a comparative thematic analysis of qualitative data from the HPTN 071 (PopART) trial in South Africa and Zambia. *Sociol Health Illn,* 43 (1):167-185.
16. Dar SA, Khurshid SQ, Wani ZA, et al (2020). Stigma in coronavirus disease-19 survivors in Kashmir, India: A cross-sectional exploratory study. *PLoS One,* 15 (11):e0240152.
17. Sardana K, Khurana A (2020). Leprosy stigma & the relevance of emergent therapeutic options. *Indian J Med Res,* 151 (1):1-5.
18. Puhl RM, Heuer CA (2010). Obesity stigma: important considerations for public health. *Am J Public Health,* 100 (6):1019-1028.
19. Ahern J, Stuber J, Galea S (2007). Stigma, discrimination and the health of illicit drug users. *Drug Alcohol Depend,* 88 (2-3):188-96.
20. Inglis G, McHardy F, Sosu E, McAteer J, Biggs H (2019). Health inequality implications from a qualitative study of experiences of poverty stigma in Scotland. *Soc Sci Med,* 232:43-49.
21. Fattah KN, Walters P (2020). "A good place for the poor "!Counternarratives to territorial stigmatisation from two informal settlements in Dhaka. *Soc Inclusion,* 8 (1):55-65.
22. Corrigan PW (2014). *The stigma of disease and disability: Understanding causes and overcoming injustices*. ed. American Psychological Association.
23. Sheehan L, Corrigan P (2020). Stigma of disease and its impact on health. *The Wiley Encyclopedia of Health Psychology*:57-65.
24. Chen S, Lu Q, Bai J, Deng C, Wang Y, Zhao Y (2020). Global publications on stigma

between 1998–2018: A bibliometric analysis. *J Affect Disord,* 274:363-371.
25. Moral-Muñoz JA, López-Herrera AG, Herrera-Viedma E, et al (2019). Science mapping analysis software tools: A review. *Springer Handbook of Science and Technology Indicators,* 159-185.
26. Echchakoui S (2020). Why and how to merge Scopus and Web of Science during bibliometric analysis: the case of sales force literature from 1912 to 2019. *Journal of Marketing Analytic*s, 8:165-184.
27. Effendi DN, Anggraini W, Jatmiko A, et al (2021) Bibliometric analysis of scientific literacy using VOS viewer: Analysis of science education. *J Phys Conf Ser*, 1796:012096.
28. Schomerus G, Leonhard A, Manthey J, et al (2022). The stigma of alcohol-related liver disease and its impact on healthcare. *J Hepatol,* 77 (2):516-524.
29. Buseh AG, Stevens PE (2006). Constrained but not determined by stigma: Resistance by African American women living with HIV. *Women Health,* 44 (3):1-18.
30. Norris A, Bessett D, Steinberg JR, et al (2011). Abortion stigma: a reconceptualization of constituents, causes, and consequences. *Womens Health Issues,* 21(3 Suppl):S49-54.
31. Foster GD, Wadden TA, Makris AP, et al (2003). Primary care physicians' attitudes about obesity and its treatment. *Obes Res,* 11 (10):1168-1177.
32. Sori LM, Sema FD, Tekle MT (2022). Internalized stigma and associated factors among people with mental illness at University of Gondar Comprehensive Specialized Hospital, Northwest, Ethiopia, 2021. *Int J Ment Health Syst,* 16 (1):58.
33. Park SG, Bennett ME, Couture SM, Blanchard JJ (2013). Internalized stigma in schizophrenia: relations with dysfunctional attitudes, symptoms, and quality of life. *Psychiatry Res,* 205 (1-2):43-47.
34. Simmonds L, Coomber R (2009). Injecting drug users: a stigmatised and stigmatising population. *Int J Drug Policy,* 20 (2):121-130.
35. Gilbert DT, Fiske ST, Lindzey G (1998). *The handbook of social psychology*. ed. Oxford University Press.
36. Prince PN, Prince CR (2002). Perceived stigma and community integration among clients of assertive community treatment. *Psychiatr Rehabil J,* 25(4):323-31.
37. Turan B, Hatcher AM, Weiser SD, et al (2017). Framing mechanisms linking HIV-related stigma, adherence to treatment, and health outcomes. *Am J Public Health,* 107 (6):863-869.
38. Frawley A (2015). Medicalization of social problems. In. Handbook of the Philosophy of Medicine. Springer Nature. https://link.springer.com/
39. Akbari H (2016). The formation of the national community (nation) and the dialectic of agency and structure; Towards a sociological theory about macro social changes. *J Sociol,* 17:3-25.