

The Epidemiology of Suicide Behaviors among the Countries of the Eastern Mediterranean Region of WHO: a Systematic Review

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Received: 31 Aug. 2013; Received in revised form: 6 Jul. 2014; Accepted: 18 Oct. 2014

Abstract- This systematic review aimed to help better to understand the epidemiology of suicidal behaviors among Eastern Mediterranean Region (EMR) countries. The PubMed, EMR medex, Scopus, PsychInfo, ISI, and IMEMR were searched with no language limitation for papers on the epidemiology of suicidal behaviors in the general population, published up to August 2013. A total of 13 articles were reviewed. The incidence (per 100,000) of committed suicide ranged from 0.55 to 5.4. The lifelong prevalence of attempted suicide, suicidal plan and thoughts were 0.72-4.2%, 6.2-6.7%, and 2.9-14.1%, respectively. The figures for suicide are higher than those officially reported. Suicide behaviors' statistics is susceptible to underestimation presumably due to the socio-cultural, religious and legal barriers, not to mention the lack of well-organized registries and methodologically sound community-based surveys.

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Acta Medica Iranica, 2015;53(5):257-265.

Keywords: Suicidal behaviors; Prevalence; Systematic review; Eastern mediterranean region

Introduction

Suicidal behaviors are of high priority among public health issues worldwide. According to the official statistics of the World Health Organization (WHO), the rate of suicide (per 100,000 population) ranges from 0.6 to 35.1 (1). Suicide is the 13th cause of death in the world and the 3rd cause of death in the age group 15 years (2). The annual mortality rate of suicide is estimated to be greater than the mortality rate due to war and homicide combined (3).

Countries of the Eastern Mediterranean Region (EMR) of the WHO are traditionally considered to be

characterized by low rates of suicidal behaviors. This attitude is based on the officially published data (0-3.1 per 100,000 for suicide) (1), the role of the local culture and Islamic religion beliefs against suicide (4).

The Islamic religion explicitly forbids taking one's life which is a major deterrent against suicide (5). But the low rates are not just yielded by the protective role of religious beliefs. Considering suicidal behaviors as sinful and shameful acts results in hiding the suicidal nature of deaths/injuries by the victims and their families (4).

Besides, there are some punishing laws including jail terms and financial penalties for suicide and

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deliberate self harm in some countries of the region (5). Lack of national death/suicide registries might be another explanation. Thus, the validity of the data officially reported to WHO by countries of the region has been questioned (6).

The results of recently conducted studies revealed higher rates of suicidal behaviors (including suicide) than those usually known in the region (1,7), suggesting that we need some more research based evidences to re-evaluate what has traditionally been accepted about suicidal behaviors in the region.

This study aimed to gather, analyze and report data through a systematic review to better understand the epidemiology of suicidal behaviors (suicide thoughts, plans, attempts, and fatal acts) among EMR countries.

Materials and Methods

Study identification and selection

The PubMed, EMRmedex, Scopus, Psychinfo, ISI and IMEMR (EMRO Index Medicus) were searched by two of authors with no timeframe and language limitation. According to each database specifications, a sensitive search was performed using combinations of different terms and subject headings related to population (Afghanistan*, Bahrain*, Djibouti*, Egypt*, Islamic Republic of Iran, Iran*, Iraq*, Jordan*, Kuwait*, Lebanon*, Libyan Arab Jamahiriya, Libyan*, Morocco*, Oman*, Pakistan*, Qatar*, Saudi Arabia*, Somalia*, Sudan*, Syrian Arab Republic, Syrian*, Tunisia*, United Arab Emirates (UAE), Yemen*, middle east, EMR countries, EMRO), Index (Prevalence, epidemiology, incidence) and outcomes (Suicide*, "commit* suicide", "attempt* suicide", "suicide* attempt", "plan* suicide", "suicide* plan*", "suicide* idea*", "suicide* behavior"). The last search updates were June 17, 2013.

The hand searching included papers' lists of references. To obtain "not electronically published", unpublished or "not in English" data, we tried to reach the professionals interested in suicide issues through the advisors of mental health in EMRO and looked for authors of papers on suicidal behaviors from EMRO countries. An email/letter was sent to them informing the purpose of the study and inviting them to participate. We received some full texts in English from Pakistan, UAE, Egypt and Bahrain.

Iranian National data banks also provided some local data in Persian language.

To estimate the overall prevalence rate, only studies with samples representing the general population were included. Thus, studies carried out specifically on certain populations (e.g. psychiatric patients) or conducted in limited clinical settings were excluded. Figure 1 shows literature search and study selection process.

Quality assessment and data extraction

All identified citations and abstracts were independently screened by two investigators to select the relevant articles subject to critical appraisal.

The Reporting of Observational Studies in Epidemiology (STROBE) statement check lists for observational studies were applied to identify studies of acceptable quality by two independent reviewers.

Uniform data extraction tables (containing data on first author, study date (year), publication date (year), country, Place (province, etc), field of study (rural/urban), sample size, sampling method, Data source, Instrument, Suicidal behavior, prevalence and/or incidence and/or frequency, Standard Errors and/or Standard Deviations) were completed by two other independent reviewers for each eligible paper. If two or more papers published repeated results of a previous study, only that one was included in the final review. Disagreements were resolved by the third reviewer's decision.

Data analysis

The prevalence (per 100,000), standard errors (SE) and confidence Intervals (CI) were extracted from selected studies. In cases where SE was not reported, it was calculated using sample size and the prevalence of the target variable. Where the crude frequencies of the suicidal behaviors were reported, the prevalence rates were estimated on the basis of the reference population size for the same period.

Results

Thirteen (8-20) studies out of the initial 34,848 titles met the criteria to be included for final review and analysis. Some general information about included articles is provided in Table1.

Table 1. Reported Prevalence, in selected studies on prevalence of committed suicide in EMR countries

First author	study date (year)	Publication date (year)	Country	Place	Field of study	Sample size	Sampling method	Data source	Instrument	Suicidal behavior
Abdel Moneim	2005-9	2012	Egypt	Assiut	urban & rural	117	census	Registered data	Data collection form	S
Saberizafarg handi	2001-7	2012	Iran	Whole country	urban & rural	53100	census	Registered data	National suicide registry system	S, A
Sharif-Alhoseini	2005-8	2012	Iran (IR)	Whole country	urban & rural	118474	census	Registered data	National injury surveillance system	S, A
Dervic	2003-9	2011	United Arabian Emirates	Dubai	urban	58	census	Registered data	Data collection form	S
Gad ElHak	1998-2004	2009	Egypt	Port Said	urban	84	census	Registered data	Data collection form	S
Malakouti	2005	2008	Iran (IR)	Karaj	urban	2300	probable	interview	SUPRE-MISS	S,A, P,T
Alansari	1995-2004	2007	Bahrain	Whole country	urban & rural	304	census	Registered data	Data collection form	S
Aghoub	2006	2006	Morocco	Casablanca	urban	800	probable	Interview	M.I.N.I	A, T
Khan	1985-1999	2006	Pakistan	Sindh province	urban & rural	2568	census	Police data	Data collection form	S
Bertolote	2002-4	2005	Iran (IR)	Karaj	urban	504	probable	Interview	SUPRE-MISS	S,A, P,T
Mohammadi	2001	2005	Iran (IR)	Whole country	urban & rural	25178	probable	Interview	SADS, DSM IV	S, A
Saeed	1998-2001	2002	Pakistan	Faisalabad.	urban & rural	95	census	Registered data	Data collection form	S
Weissman	1992	1999	Lebanon	Beirut	urban & rural	435	probable	Interview	CIDI, DSMIII-R	S,A, T

Suicide

The prevalence (per 100,000) of suicide ranged from 0.55 (8) to 5.4(17). A prevalence rate of 12.6 suicides per 100,000 has also been reported in expatriate population (mostly Indians) in Bahrain (10).

The weighted male/female ratio among suicide cases was 0.59/0.39.

Suicide attempt

The lifetime prevalence of attempted suicide extracted from community-based surveys varied from 0.72% (20) to 4.2% (11). In this document, we used the term "suicide attempt" to designate all non-fatal suicidal behaviors, regardless the presence of suicide ideation at the time of the act.

Considering one-year periods, suicide attempts registered in Iran (national suicide/suicide attempt records) were 6.4, 14 and 11.3 per 100,000, respectively in 2001, 2005 and 2007 (17). Despite this, data from the Iran National Injury Surveillance System suggest that in one-year period suicide attempts rate may exceed 166 per 100000 (19).

Distinct lifelong suicide attempt prevalence data have been reported for men and women. In Morocco, male and female prevalence rates were reported at the level of 1.5 and 2.7%, respectively ($P=0.059$) with an overall prevalence rate of 2.1% for suicide attempts in both genders (9). In Iran, the gender-specific prevalence rates were 3.4% and 2.9% respectively for females and males, and overall prevalence rate of 3.3% (15). The weighted male/ female ratio among attempters was 0.47/0.53.

Suicide plan and thoughts

The two studies retrieved from Iran reported lifelong and one-year frequency of suicidal plan among people over 14 years of age to be 6.2-6.7% and 2.9%, respectively. The lifelong prevalence of suicidal plan was about 7% in female and 5% in males.

The overall frequency of suicidal thoughts in the lifelong span varied between 2.88% (20) to 14.1% (11).

From suicidal thoughts to completed suicide

Given that data for each pair of consecutive steps from suicide thoughts (T) to plan (P), plan to attempt (A) and

attempt to suicide (S), were available for a population, one might calculate three ratios which in turn could be applied to estimate the prevalence.

These data were only available from Iran, for which

the A:S ratio was 1:3.36, 1:2.59 and 1:2.29 based on 2001, 2005 and 2007 data. While the lifelong and one month period, A:P were 1.8 and 1:2.9, respectively. The lifelong P: T ratio was 1:2.04 for the Iranian population.

Table 2. Prevalence, sex distribution of different suicidal behaviors in EMR countries (reported in selected studies)

Countries (reported in selected studies)				
First author (Publication year)	Country	Prevalence per 100,00 (SE)	Gender proportions	
			Male	Female
Committed suicide				
Saberizafarghandi (2012)	Iran (IR)	2001: 1.9(0.5) 2005: 5.4(0.87) 2007: 5(0.83)	48.8	49.3
Sharif-Alhoseini (2012)	Iran (IR)	1.7(0.49)	64	36
Abdel Moneim (2012)	Egypt	0.67(0.2)	58.12	41.88
Dervic (2011)	UAE; natives	0.9(4.9)	-	-
	UAE; expatriates	6.3 (7.8)	-	-
Gad ElHak (2009)	Egypt	15.53 (13.8)		
Al Ansari (2007)	Bahrain; natives	0.6 (0.0017)	NA	NA
	Bahrain; expatriates	12.6		
Khan (2006)	Pakistan	0.643 (.049)	72	28
Saeed (2002)	Pakistan	1.12 (.231)	71	29
Attempted suicide		Prevalence (SE)		
		2001:		
SaberiZafarghandi (2012) ^b	Iran(IR)	6.4(0.9)/100,000 2005: 14(1.4) /100,000	44.2	55.5
Sharifalhoseini (2012) ^b	Iran(IR)	166/100,000	47	53
Malakouti (2008) ^a	Iran(IR)	3.3 (0.37)/ 100	35.2	64.8
Malakouti (2008) ^b	Iran(IR)	1(0.2)/100	35.2	64.8
Aghoub (2006) ^a	Morocco	2.1(0.5)/100	50	50
Bertolote (2005) ^a	Iran(IR)	4.2(0.89)/100	37	63
Mohammadi (2005) ^a	Iran(IR)	1.4(0.07)/100	50.2	49.8
Weissman (1999) ^d	Lebanon	7.2(1.2)/100	-	-
Suicide plan				
Malakouti (2008) ^a	Iran (IR)	6.2(0.5)/100	-	-
Malakouti (2008) ^b	Iran (IR)	2.9(0.34)/100	35.2	64.8
Bertotote (2005) ^a	Iran (IR)	6.7(1.1)/100	37	63
Suicide thoughts				
Malakouti (2008) ^a	Iran (IR)	12.7 (0.69)/100	-	-
Malakouti (2008) ^b	Iran (IR)	5.7(0.24)/100	35.2	64.8
Aghoub (2006) ^c	morocco	6.3(0.85)/100	50	50
Bertolote (2005) ^a	Iran (IR)	14.1(1.5)/100	37	63
Weissman (1999) ^a	Lebanon	2.9(0.8)/100	-	-

Discussion

Retrieving only 13 nationally representative papers,

from 22 countries, in over than 40 years indicates the scarcity of published data in the field of suicide-related phenomena in EMR countries. Though one may think that

'too' rigorous criteria have limited the number of eligible articles, another possible motive to explain the modest presence in the literature of papers on this topic is that suicide issues are considered as "unimportant" by health professional and authorities in EMR countries. This may hinder researchers' ambitions to compete with limited budgets in an issue that is presumably not considered as a public health priority.

The number of studies is even scarcer about observations regarding attempts, plans and thoughts of suicide. It is clear that suicide represents the most relevant problem; however, the evolution of other non-fatal suicidal behaviors -as preceding factors and predictors of

final outcome -would deserve more investigation.

Comparing with present findings the suicide rates (per 100,000) reported by WHO for Iran: 1991 (males=0.3, females=0.1), Bahrain: 2006 (males=4, females=3.5), Jordan: 2008 (males=0.2, females= 0.0), Kuwait: 2009 (males=1.9, females= 1.7) and Egypt: 2009 (males=0.01, females=0.0) suggests that officially reported statistics does not portrait the state of suicidality in countries of the EMR. In the Egypt, for instance, if the observed trends of change in suicide rate from 1998-2004 were applied to the official 1999 rate reported to WHO one should expect the suicide rate in the country to reach the "zero" by 2010 (Figure 1).

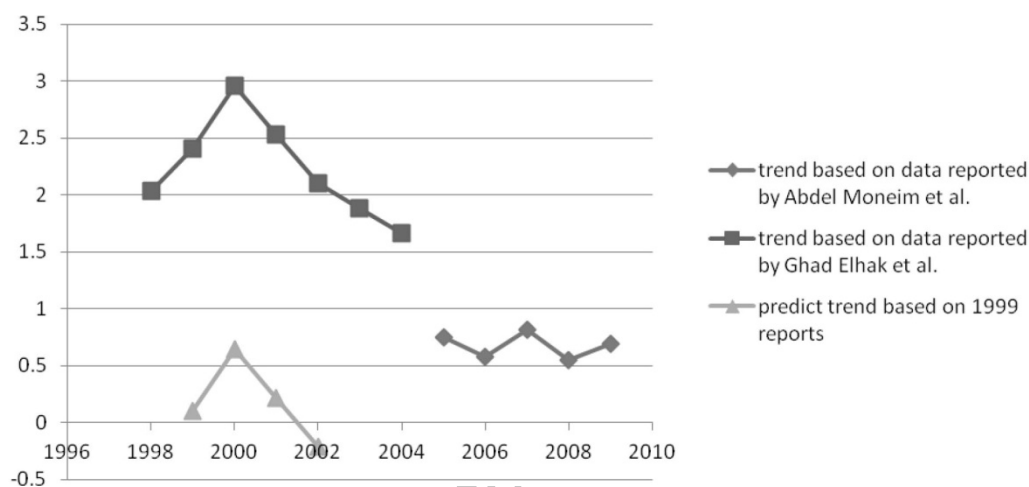


Figure 1. Comparison of suicide rates based on current studies and those predicted using data reported to WHO.

As the results show, the range of behaviors is so wide in some of the statistics. This may be due to the methodology of data registration, collection and also the sources of data registration. The stigma and considering the suicide behaviors being against the law oblige the family and also health personnel to not mention the suicide intention in Emergency departments. Again, the discrepancy between collected data from research activities health system could be another reason for providing more large or narrow range of data.

For Iran - where authors accessed grey literature meeting the study inclusion and quality criteria (Table 3) - there were even discrepancies between nationally and internationally published data. Studies of good design that reported higher rates than the country's pooled estimate did not get the chance to be published. We believe that they were just reporting some local issue that did not deserve wider attention, or were accused of reflecting an altered image of the reality. However, policy makers should be aware that relying only on pooled estimates might lead to some degree of inadvertency. Figure 2

clearly shows how far pooled estimates might be from some actual statistics.

As stated by Khan and Hyder, "socio-cultural barriers, religious stigma and punitive laws" limit the proper reporting of suicidal behaviors in the region. Moreover, lack of national suicide registries (except for Iran, from 2001) or comprehensive nationally representative surveys with sound methodologies, makes it difficult to extract reliable indices of suicide and suicidality from literature to use for trend analysis or comparison between countries or regions. This is in part reflected in the large number of evidences excluded from the final review because the study population was not representative for the whole country.

In conclusion, men are believed to die by suicide more than women. But in some countries of the region, women-men gap in suicidal deaths is narrowed, especially in younger ages. Forced marriage, unwanted pregnancy, being financially dependent on one's husband, unfair divorce laws, unemployment and limited job opportunity for women, may bring a sort of social hopelessness in

women. In this context, suicidal behaviors may be an automatic reflection of this type of hopelessness particularly in the hard situation of life that usually

happens during the first several years of married life for women.

Table 3. Prevalence, age and sex distribution of committed suicide, retrieved from Iran's grey literature

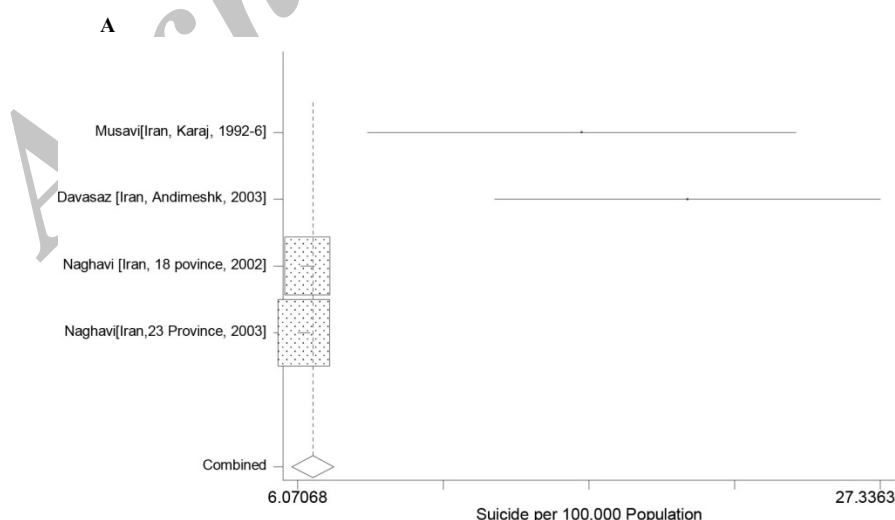
First author (publication year)	Prevalence (SE)	Age (years)	Gender		Ratio Men: women
			Male (%)	Female (%)	
Iran (IR)					
Yasami (2002)	3.1 (.391)	12 – 85 26.7(13)	69.4	30.6	2.3:1
Janghorbani (2005)	17.4 (1.85)	>10 M:29.4(16.6) F:25.6(12.6)	23.9	75.1	1:3
Hamednia (1998)	4.35 (.0816)	NA	77	23	3.3:1
Lotfollahi (1996)	3.1 (0.303)	>11	74	26	2.8:1
Zahedi (2000)	3.9 (.569)	>14	52	48	1.1:1
Moradi (2002)	6.9 (.906)	NA	64	36	1.8:1
Musavi (2000)	16.4 (3.99)	NA	41	59	1:1.4
Davasaz (2003)	20.3 (3.58)	>17	59	41	1.4:1
Naghavi (2002)	6.43 (.134)	-	-	-	-
Naghavi (2003)	6.3 (.117)	-	-	-	-

In western provinces, most of the time the rate of suicide among female is higher than the male. This trend is somehow stable in middle provinces of Iran like Kerman and Tehran which indicated higher rate among male than female

The prevalence of suicide attempts in EMR residents seems to be similar to the Australians (4.2%) (21), Swedish (2.6-2.7% lifetime, in the years 1986 and 1996) (22) and American populations (4.6%) (23). In the WHO/SUPRE-MISS study (24), the prevalence of suicide attempt also ranged between 0.4-4.2%.

Prevalence data for suicide ideation (lifetime and one-

year) are also consistent with reports from Sweden (8.6 and 12 percent - one year - in 1986 and 1996 respectively) (22), US (13.5% for lifetime) (15), Australia (10.4% for lifetime) (21) and the WHO/SUPRE-MISS study, where the eight participating countries showed variations in lifetime suicide ideation between 2.6% and 25.6% (24).



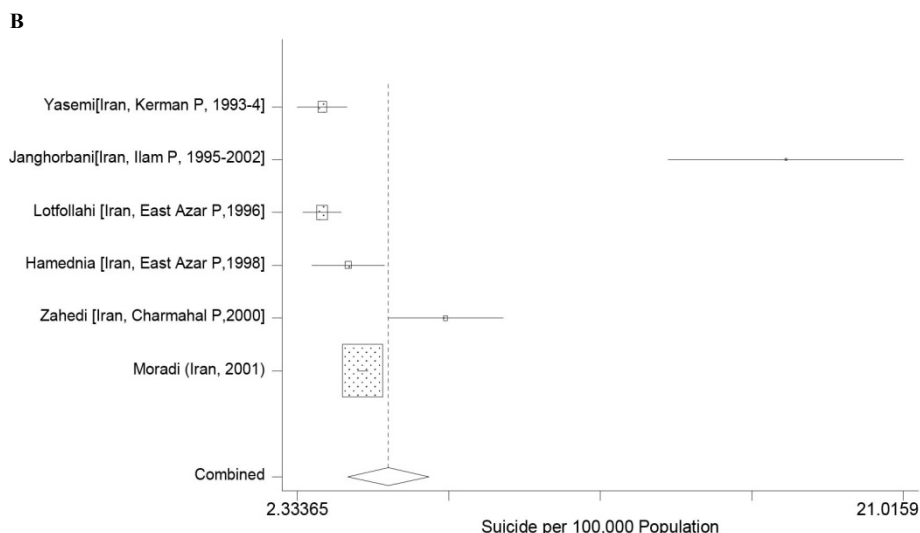


Figure 2. The raw statistics and pooled estimates of suicide rate retrieved from Iran's grey literature
A) Studies based on Primary Health Care (PHC) System data, B) Studies based on Legal Medicine data

Rates of lifetime suicide plans obtained from the current study were higher than the prevalence recorded in the US (3.9%, lifetime) (23) and Australia (4.4%, lifetime) (21). Within the WHO/SUPRE-MISS study, the range of variability for suicide plans among countries was 1.1-15.6% (24).

In spite of the similarities in prevalence of thoughts, plans and attempted suicide between EMR countries and some other western regions, the rate of deaths due to suicide is remarkably lower in EMR than in most European countries (on average, 12-40 suicide per 100,000 people), Australia (21), and the US (23).

This apparently perplexing issue could be related to the lack of accurate and reliable registration system in developing countries which may artificially lower the rate of suicide compared to non-fatal suicidal behaviors. Stigma and considering suicide as a sin and law-abided ouster the victim's family from insurance claims and other possible forms of social support, but may also hinder victim's family/relatives and even the health personnel to report the suicide event to the authorities.

On the other hand, religious beliefs may act as a strong protective factor against suicide but may act less strongly against suicide ideation and plans. In such conditions, as noted by Pritchard and Amanullah, overt forms of suicide may be substituted by other risky behaviors which might easily increase death probability such as reckless driving (25). In this case, suicidal deaths would be 'misclassified' and remain hidden under 'Other Violent Death' category.

Another explanation for the attempted/complete ratio detected in this study could be represented by the prevalence of cases of "cry for help" (rather than those with real "intent to die") particularly common among

women.

Though national registries seem to provide more accurate data on suicide, surveys are better tools to investigate other types of suicidal behavior. Not only "ideation" and "plans" for suicide are impossible to be properly registered in national databases, but also "attempts" are inevitably underestimated by registries. In fact, not all attempts lead to medico-legal admissions or referrals, and not all attempters confess their real intentions at the time they present to healthcare facilities. In one study, the results showed that 10% of the attempters represent in emergency departments (21).

We were not able to communicate with all focal points in EMR countries so that gray literatures were not available for inclusion in this study.

The prevalence of completed suicide in EMR countries is higher than what has been officially reported, but still is lower than in most other regions. Data on non-fatal forms of suicidal behaviors seem to be more consistent with western findings. These similarities and differences provide an opportunity for researchers to explore the different facets of the socio-cultural and risk factors for suicide, as well as the naturalistic factors that contribute to low rates of suicide in Islamic countries.

As declared by WHO reliability of suicide certification and reporting is an issue in great need of improvement. Developing national systems for the registry of death, violence, and suicide among EMR countries would constitute the essential starting point to provide national suicide prevention strategies and programs (21) also in the EMR countries. As it was the case of Iran, suicide rates are expected to dramatically 'increase' upon implementation of national registry systems. In fact, efforts in the direction of more rigorous

and possibly more inclusive recording of causes of death may frequently bring to substantial differences compared with previous knowledge. To draw a more accurate portrait from other suicidal behaviors, periodical surveys with uniform methodology and tools - may serve the purpose the best.

Acknowledgment

We would like to thank Dr. Mohammad Taghi Yasami and Dr. Alexandra Fleischmann (WHO, Geneva) for their excellent review and comments. We also acknowledge Dr. Mustafa Afifi (Oman) and Dr. A. Rahman (Pakistan) for their participation in providing articles for this review.

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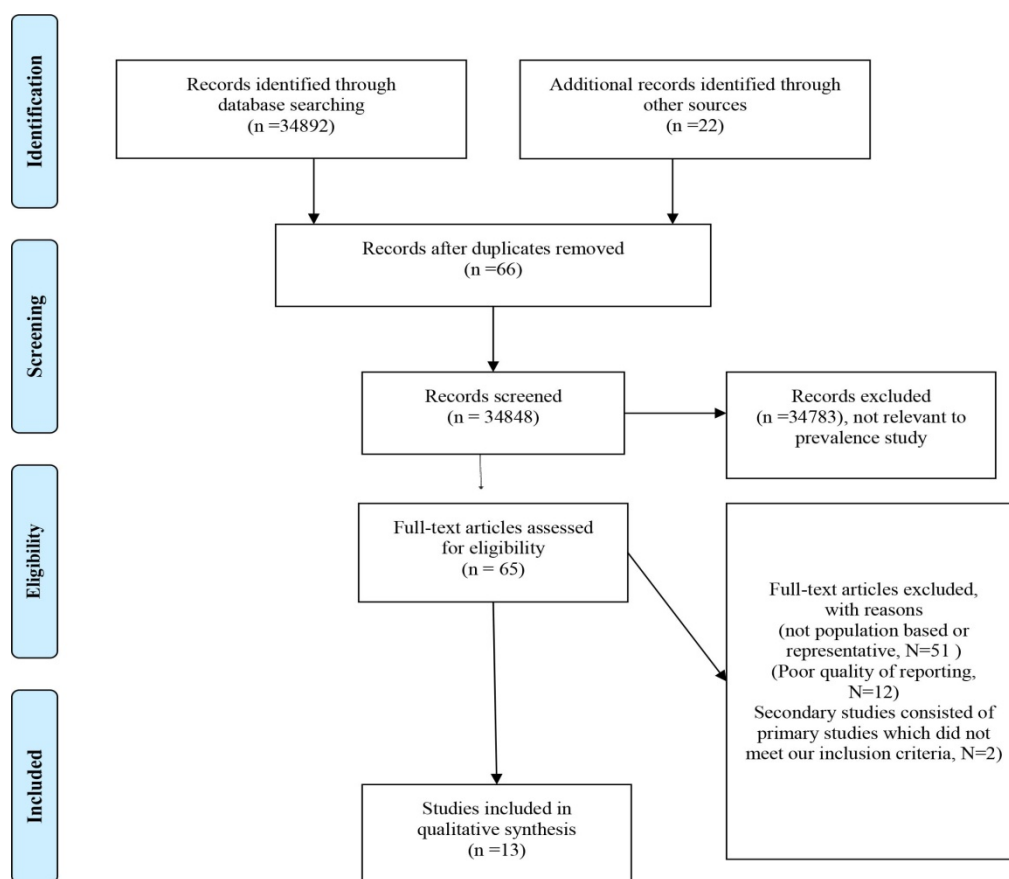


Figure 1. Flow diagram of study selection