International Journal of Preventive Medicine

Original Article Open Access

Geographical Disparities in the Health of Iranian Women: Health Outcomes, Behaviors, and Health-care Access Indicators

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How to cite this article: Bayati M, Feyzabadi VY, Rashidian A. Geographical disparities in the health of iranian women: Health outcomes, behaviors, and health-care access indicators. Int J Prev Med 2017;8:11.

ABSTRACT

Background: Women's health is a key factor affecting the health of the whole population. Tackling inequality in determinants of health is recognized as the main path toward reducing the inequality in health outcomes. This study aimed to analyze the provincial inequality in determinants of women's health and health care in Iran.

Methods: Using the Moss's model (2002) as a comprehensive framework of determinants of women's health, including "geopolitical environment," "culture, norms, sanctions," "women's roles in reproduction and production," "health-related mediators," and "health outcome" categories, we chose 13 indicators. Afterward, using data sources including the Iranian Multiple Indicators of Demographics and Health Survey, the National Organization for Civil Registration, and Statistics Centre of Iran, we analyzed provincial inequality in these indicators in Iran (2011). Gini coefficient and Lorenz curve were used for measuring inequality.

Results: Gini coefficients calculated as follows; life satisfaction level (0.027), literate women (0.398), women with proper knowledge about HIV/AIDS prevention (0.483), unemployed women (0.380), women without an income (0.384), women who use at least one type of mass media (0.389), women who used computer or internet (0.467), women who had received pregnancy care from a skill birth attendant (SBA) (0.420), women who had delivered with the help of an SBA (0.426), women who currently smoke cigarettes (0.603), women who currently consume hookah (0.561), women with at least one chronic disease (0.438), and women's deaths in 2010 and 2011 (0.393 and 0.359, respectively).

Conclusions: We found large provincial disparities in determinants of women's health in Iran. Determinants such as lifestyle, health behavior, health knowledge, and health-care services availability should be considered by health policymakers in addressing the inequality in women's health at a provincial level.

Keywords: Demographic and health survey, health behavior, health care inequalities, social determinants of health, women's health

Access this article online	
Quick Response Code:	**Website:** www.ijpvmjournal.net/www.ijpm.ir
	DOI: 10.4103/ijpvm.IJPVM_67_16

INTRODUCTION

Women are considered one of the most important population groups, who play a key role in the social and economic development of any country. For this reason, addressing the health needs of women can stimulate better health of society.[1] However, women and men stand in a position of unequal power, and this issue results in the poor socioeconomic status of women and makes them more susceptible to poor health.[2] Today, addressing women's health is considered one of the high priority issues in public health of all countries, particularly low- and middle-income countries.[3] Hence, the determinants of women's health and planning new interventions and policies for improving them are pivotal for health policymakers.

In recent decades, the health sector in most countries has paid attention to the issue of removing the health disparities and inequalities in health, in addition to improving the population's health. However, there is a wide range of women's health-related issues such as violence and other human rights abuses, poverty, disempowerment, marginalization, unmet specific health needs, inadequate access to health services, unequal access to health information, and less access to education.[3-5]

From one perspective, there are two areas of health inequity; health-care financing and distribution.[6] The equity in distribution has two main areas including disparity in health and health care. The former means disparity in health outcomes and illness burden which might refer to differences resulting from socioeconomic factors rather than biological differences known as social determinants of health (SDH).[7-9] However, the latter refers to conditions of access, treatment, and quality. Some previous studies conducted in Iran focused on health-care financing,[10,11] health-care access and utilization,[12-14] and health outcomes.[15,16]

Considering the different and diverse factors affecting women's health outcomes across cultures and nations, Moss has explained a comprehensive and unified framework which encompasses a wide range of determinants for the patterning of women's health.[17] Since this framework contains both determinants of women's health at micro- and macro-levels among different communities, it may lead to better understanding the current situation of women's health determinants, to promote equity, equality, and well-being.

Notwithstanding addressing women's health in policy making of Iran in recent years, there are few published studies and comprehensive evidence of disparities in determinants of health among Iranian women. The present study aimed to measure geographical disparities in some health outcomes and health mediators within and without the healthcare system among Iranian women aged 15–24 and 15–54 years.

Demographic and health surveys (DHSs) provide valuable data on health and the population at the national and regional levels for assessing a range of indicators. Many studies in public health area, especially on children[18,19] and women's health,[19-23] have used DHS data. Inequality and disparity measurement in women's health is one secondary use of these data. However, most previous studies of inequality in women's health, particularly in low- and middle-income countries, were mainly focused on single or limited indicators and less based on diverse and multiple indicators of health-related factors.[24-31] For this reason, the present study includes two distinctions as compared with previous studies. First, we assess the disparity in various factors related to women's health at the provincial level. Second, we also present the disparity of indicators based on a theoretical framework of the patterning of women's health in a developing country. Use of this framework adds some value to better understanding of the interrelationship of factors in influencing women's health. Therefore, our study provides a framework for women's health inequality measurement based on DHS data, especially in developing countries.

METHODS

Conceptual framework, data, and variables

We used a conceptual framework based on the Moss's study[17] for categorizing and better understanding of the social determinants of women's health. This framework categorizes the determinants of women's health into five areas as follows: geopolitical environment; women's roles in reproduction and production; culture, norms, and sanctions; health-related mediators; and health outcomes. Every category includes some subcategories and each subcategory includes several factors. In the current study, a few variables were selected for measuring inequality in women's health based on data availability and Moss's framework. Therefore, we limited our analysis to a few factors in Moss's framework. Our selected variables, their category and subcategory, and their definition are presented in Table 1.

We used three data sources for measuring geographical disparities and inequalities, including the Iranian Multiple Indicators of Demographics and Health Survey (IrMIDHS),[32,33] crude death data of the National Organization for Civil Registration (NOCR),[34] and Census 2011 of Statistics Centre of Iran (SCI).[35]

The main data source of our study was IrMIDHS. It was a cross-sectional, multistage stratified cluster random survey carried out using face-to-face household interviews aiming to estimate various demographic and health indicators in 31 provinces in Iran. This survey was conducted during 2010–2011 among proportional

Table 1: Women health framework and the summary of variables definitions and statistics

Category/Subcategory of Moss's Framework	Name of Index	Mean (±SD)	Min (Province*)	Max (Province)
Geopolitical Environment				
Welfare	Life satisfaction level for women aged 15-24	1.90 (0.08)	1.69 (S&B)	2.08 (A)
Culture, Norms, Sanctions	% of literate women aged 15-24	92.99 (6.26)	68.58 (S&B)	99.46 (M)
Sociodemographic characteristics/education	% of women aged 15-54 with proper knowledge about HIV/AIDS prevention	31.93 (7.29)	13.84 (S&B)	43.33 (Y)
Women's roles in reproduction and production				
Household/Labor market role	% of women aged 15-24 with no job	90.75 (4.48)	74.49 (A)	97.54 (L)
Household/Wages	% of women aged 15-24 with no income	88.93 (5.35)	69.84 (L)	96.64 (Z)
Health related mediator	% of women aged 15-24 who use at least one type of mass media per week (TV, Radio, Newspaper)	98.35 (1.45)	91.61 (S&B)	100 (A; NK)
Social capital, network, support/Other ties	% of women aged 15-24 who used computer or internet during the past year	52.95 (12.49)	14.76 (S&B)	75.21 (S)
Health services	% of women aged 15-54 who receive pregnancy care from a SBA	96.92 (2.18)	92.69 (S&B)	100 (L; K&B; A; H; I; C&B; G; Q; S)
Availability/use	% of women aged 15-54, who had delivered with the help of a SBA	96.42 (5.58)	70.26 (S&B)	100 (G; Q; I; SK; B; C&B; Z; A; L; H; WA)
Behavior	% of women aged 15-54 who currently smoke cigarettes	0.76 (0.42)	0.00 (SK; I)	1.51 (A; WA)
Smoking/drinking	% of women aged 15-54 who currently consume Hookah	5.04 (4.85)	0.23 (WA)	18.32 (B)
Health outcome	% of women aged 15-54 with at least one chronic disease	19.99 (6.56)	7.57 (Z)	36.27 (B)
Chronic disease	Frequency of total women's deaths in 2011	6240 (5189)	1189 (I)	22937 (T)
Mortality	Frequency of total women's deaths in 2010	6632 (6334)	1061 (I)	26955 (EA)

A=Ardebil, S&B=Sistan&Balouchestan, M=Markazi, Y=Yazd, SK=Southern Khorasan, T=Tehran, B=Boushehr, EA=Eastern Azarbayejan, I=Ilam, WA=Western Azarbayejan, H=Hamedan, G=Gilan, Q=Qom, NK=Northern Khorasan, Z=Zanjan, L=Lorestan, C&B=Chaharmahal&Bakhtiari, S=Semnan

samples of the population size in each district within each province. Furthermore, the samples were selected from rural and urban areas in each district. In total, a sample of 30,960 households (2187 urban vs. 909 rural) was included in IrMIDHS.[32] A total of 35,305 females between 15 and 54 years participated in the study. In our study, the data on females were analyzed at the aggregate level of each province.

Values of variables in IrMIDHS were reported mostly in percentage or rate scales. However, to measure inequality, we also needed the crude and absolute values of variables. Hence, we used a crude number of the women's total population per age groups and province that was extracted from Census 2011 of SCI for calculating the actual absolute values of variables. To analyze the inequality in a health outcome, i.e., mortality, we also used crude death rate for women obtained from NOCR in 2010 and 2011.

Data analysis

The Gini coefficient is used for measuring several aspects of health inequities, through comparisons between different levels of geographic categorization, including local, county, and state levels among different population groups.[10,36-38] For this reason, Gini coefficient and Lorenz curve were used for measuring inequality in women's health.

The Lorenz curve is a cumulative measure of inequality that indicates distribution of a variable graphically. As shown in Figure 1, the cumulative share of population when the different provinces are ranked by greatest amount of disadvantages to the greatest amount of advantages value of variable (X-axis), against the cumulative share of variable (Y-axis). The diagonal (45°) line represents perfect equality of the variable in the population and the curve shows departures from perfect equality.[39]

The Gini coefficient is another measure of inequality at the aggregate level that is derived from the Lorenz curve. The Gini coefficient is equal to the area between the Lorenz curve and the diagonal line, divided by the triangle below the equality line $(\frac{A}{B})$. It takes values

between 0 (perfect equality) and 1 (maximum amount of inequality) [Figure 1].

Gini coefficient can be calculated as follows:

$$\text{Gini coefficient} = 1 - \sum_{i=0}^{k-1}(Y_{i+1} + Y_i)(X_{i+1} - X_i)$$

In the above equation, Y_i, X_i, and k show the cumulative share of variable in the i^{th} province, cumulative share of population in the i^{th} province, and total number of province. For every variable, the Lorenz curve, Gini coefficient, and their confidence interval were estimated.

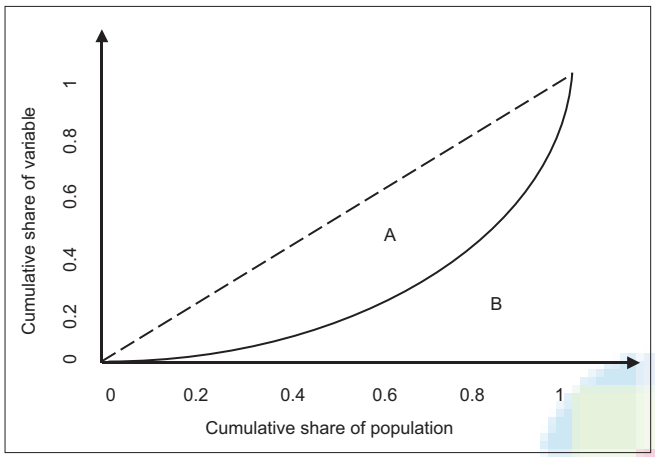

Figure 1: The Lorenz curve

RESULTS

Before reporting the comparative results, it would be useful to have a look at general status of women's health in Iran. Crude death rate for women was 2.8 (per 1000). About 20% of women aged 15–54 years suffer from at least one chronic disease (skin diseases, diabetes, asthma, cardiovascular, and joint diseases). The literacy rate for young women (15–25 years of age) was 96.83%; this rate was 80.07% in women over 6 years old. Almost 96% of deliveries were conducted by a skilled birth attendant (SBA).

Findings showed that of the 31 provinces, Sistan and Balouchestan had the lowest value in terms of most indices, including welfare, education, and health-related mediator factors. However, the highest values of indices were related to different provinces (e.g., Ardebil, Markazi, Yazd, Lorestan, and Zanjan). Of the studied indices, the most difference between the highest and the lowest values was related to crude women's mortality (standard deviation [SD] =6334 and 5189 in 2010 and 2011, respectively), the percentage of women who use computer or internet (SD = 12.49), the percentage of women with proper knowledge on HIV/AIDS (SD = 7.29), the percentage of women with at least one chronic disease (SD = 6.56), and the percentage of literate women (SD = 6.26), respectively [Table 1].

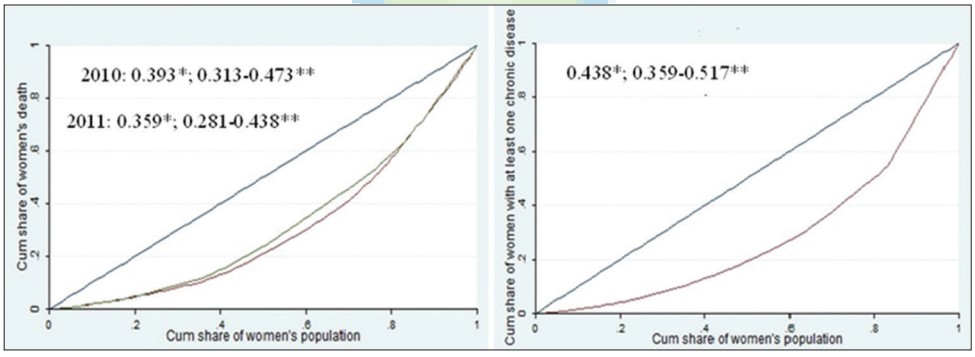

Figure 2: Disparities in health outcomes. *Gini coefficient, **Confidence interval

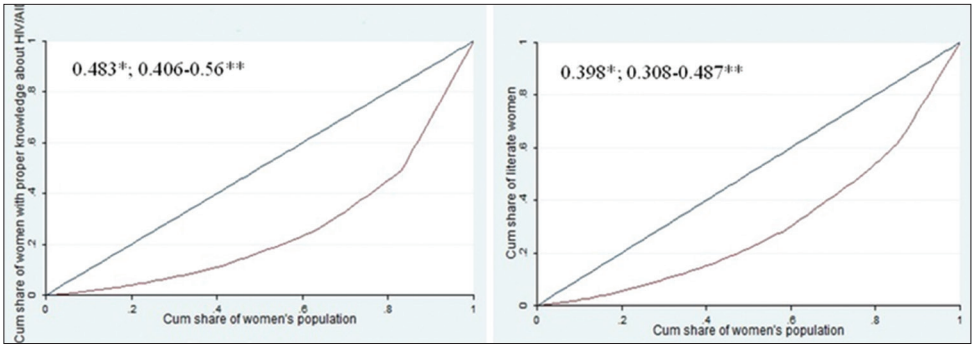

Figure 3: Disparities in culture, norms, and sanctions. *Gini coefficient, **Confidence interval

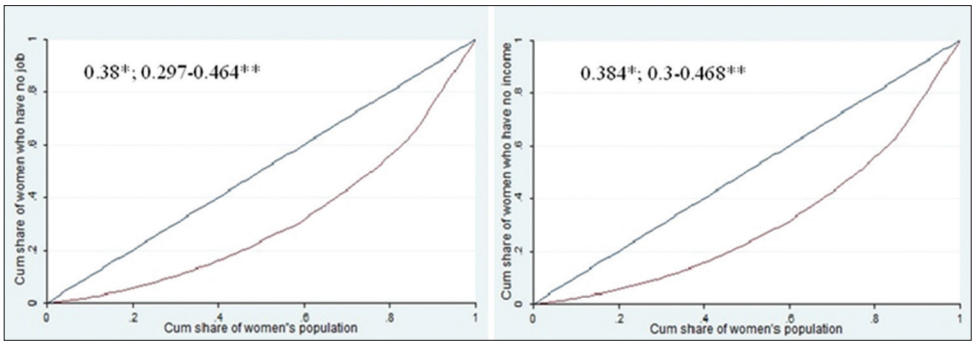

Figure 4: Disparities in women's roles in reproduction and production. *Gini coefficient, **Confidence interval

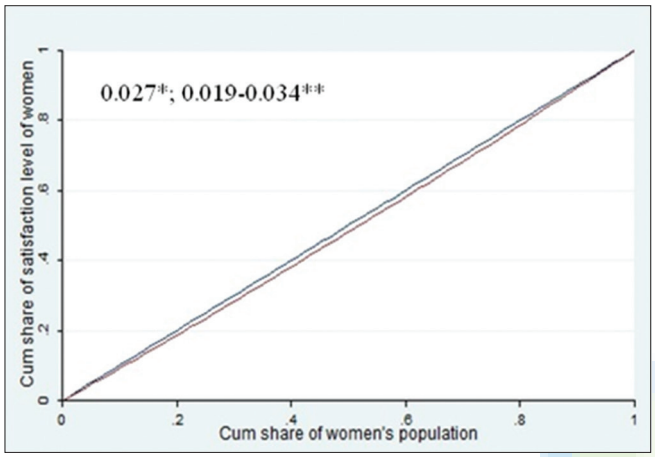

Figure 5: Disparity in geopolitical environment. *Gini coefficient, **Confidence interval

It should be asserted that life satisfaction level for women aged 15–24 years (in geopolitical environment/welfare category) had a Likert scale (1 = most to 5 = least satisfaction level). In other words, a higher score of the index shows a lower life satisfaction.

The Lorenz curve and estimated Gini coefficient for 13 variables in five main categories are shown in Figures 2-6.

DISCUSSION

This study examined the geographical disparities in multiple health determinants and outcomes of women's health based on Moss's framework in Iran. It is the first comprehensive attempt to describe and measure provincial inequality in the health of Iranian women.

The findings of descriptive statistics and the Gini coefficient showed that there are different levels of disparity in the different determinants of women's health across the provinces. Results of provincial disparity for every factor will be indicated as follows.

Our study showed that the largest provincial disparity was related to "women aged 15–54 years who currently smoke cigarettes," followed by "women aged 15–24 years who currently consume hookah" and "women aged 15–54 years with proper knowledge about HIV/AIDS prevention." The least disparity was related to "level of life satisfaction in women." Extra explanation on mentioned findings is presented later.

In the geopolitical environment category, disparity in the level of life satisfaction was assessed. Related findings showed that women in all provinces have approximately equal life satisfaction. However, part of this equality could be attributed to the fact that the feeling of life satisfaction mainly depends on people's perspective on their life not to their living conditions and socioeconomic status.[40]

In the culture, norms, and sanctions category, results demonstrated large disparity for literate women aged 15–24 years and women aged 15–54 years with proper knowledge about HIV/AIDS between provinces. Considering the fact that education directly benefits women and their children and also is a main determinant of health services utilization,[25] well-being, and health outcome,[41-44] it can be implied that disparity in it could be considered the main cause for disparity in women's health outcomes in Iran. In other researches, it was asserted that women in many (developed and developing) countries have less access to education.[4] Young women almost constitute more than 60% of 15–24-year olds living with HIV/AIDS.[1] In Iran, the prevalence and mortality rate of HIV/AIDS were 93 and 6 per 100,000 populations in 2012, respectively.[45] At least 50% of which were women. The provincial distribution of HIV mortality and morbidity was not available for more analysis, but it could be said that the disparity in proper knowledge about HIV/AIDS might be the reason behind the disparity in HIV/AIDS morbidity.

Preventive interventions such as education are viewed as the best strategy for controlling the growth of AIDS.[1] However, in the current study, disparity in health knowledge proxies by knowledge about HIV/AIDS estimate very high. Furthermore, the female population with proper knowledge about HIV/AIDS in the country is less than one-third of the total population. The findings

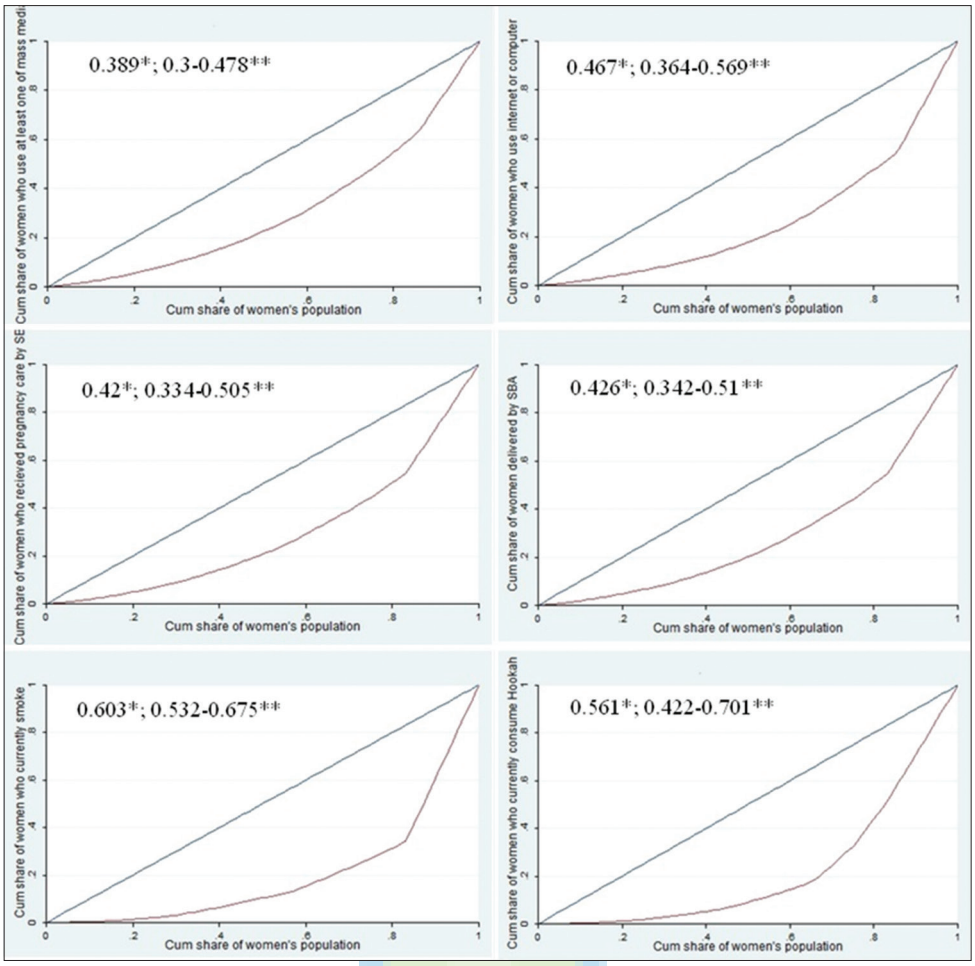

Figure 6: Disparities in health-related mediators. *Gini coefficient, **Confidence interval

showed an unsatisfactory situation of overall rate and distribution of health knowledge among Iranian women. Thus, policymakers should pay attention to promoting education, particularly health education in provinces such as Sistan and Balouchestan, Western Azarbayejan, Kohkiloyeh and Boyerahmad, Ardebil, Northern Khorasan, and Hormozgan, which are very disadvantageous (lower than one forth) among others.

In women's roles in reproduction and production, the findings indicate moderate disparity for the percentage of women aged 15–24 years with no job and the percentage of women aged 15–24 years with no income between the provinces. Employment and income are the key SDH.[46-48] As shown in other studies, poorer people received less maternal health care from an SBA.[29,34] The overall rate of women aged 15–24 years with no job and women aged 15–24 years with no income is high (about 90%), which may be related to cultural and social factors concerning women's employment in Iran. These factors are completely irrelevant to the health-care system, and improving them requires an inter-sectoral planning in the country. Further studies have shown that women's education and wealth status contribute greatly to maternity-care services utilization.[49]

Health-related mediators

As concluded by Moss, these factors mediate social, economic, and cultural effects on health outcomes. Indicators of this section are encompassed in three parts including accessibility to media and a computer or the internet, utilization of professional health providers, and high-risk behaviors.[17] Most regional disparities were related to high-risk behaviors including smoking and hookah use among women aged 15–54 years. For nearly one-third of the regions, smoking and hookah use fall short of the population averages. The disparity with respect to health-related risk behaviors is very striking.

Furthermore, there were remarkable differences in delivery by an SBA and pregnancy care by an SBA. A study in Namibia also showed that there was remarkable disparity in delivery by skilled health providers among different geographical regions.[25] Other studies also proved that there is inequality in maternal health-care services.[24] There is a negative relationship between delivery by SBA and maternal mortality rate.[50] Thus, it is necessary that all interventions are concentrated in regions with fewer deliveries by SBAs. It was also observed that there

are regional disparities in access to at least one type of mass media and computers or internet among women 15–24 years of age.

Health outcomes are the main goal of any health system.[51] Disparity in health outcomes is a key and final part of evaluation of a broad equity concept in health systems. In the current study, due to limitation in data availability, women's health outcome was limited to "women aged 15–54 years with at least one chronic disease" and "crude death rate of women." Disparities in these indicators were also noticeable. Bushehr province had the highest ratio of women aged 15–54 years with at least one chronic disease. These chronic diseases included diabetes, joint, skin, asthma, and coronary diseases. Moreover, this province also had the highest ratio of consumption of hookah and smoking, which are two of the most common risk factors for noncommunicable diseases. These results support the correlation of disparity in smoking and chronic disease in women among provinces. A review study[52] concluded that hookah consumption is possibly associated with respiratory illness. Moreover, many studies also showed that tobacco smoking is associated with an increased risk of type 2 diabetes[53] and asthma.[54] Although inequality in women's death in 2011 was decreased compared to 2010, it still showed considerable disparity among the regions.

Considering the interrelationship of factors influencing women's health in Moss's framework, it can be concluded that health-related mediators and sociodemographic characteristics/education had the most disparities among different regions at the country level which might exacerbate the inequality in health outcomes of women in Iran.

Study limitations

This study had some limitations. First, although the main advantage of Gini coefficient is that it is a measure of disparity which is widely used in public health, it cannot distinguish the inequalities among subgroups of the population.[39,55]

Second, our analysis of disparities was based on aggregate data for the female population at the provincial level. Notwithstanding, this analysis addresses that area or place effect[56] has some implications regarding women's health disparities among provinces; however, it does not measure the disparities within provinces and other population subgroups. Therefore, it is necessary that future research is focused on disparities among female population subgroups using individual data to eliminate avoidable disparities through appropriate effort and resource reallocation.[57]

Third, some indicators such as women aged 15–54 years with at least one chronic disease were based on self-report data. This indicator might be faced with underestimate bias. Moreover, areas with better socioeconomic status and therefore, greater self-consciousness might overestimate this indicator. In a study conducted on data of DHS, it was shown that the education level of mothers is negatively associated with child mortality and positively associated with reported child morbidity. This positive relationship between socioeconomic level and reported morbidity was a result of recall and reporting bias among mothers in lower socioeconomic classes.[58] For this reason, the present study showed that some provinces with lower socioeconomic levels compared to higher ones had higher rate of reported morbidity for chronic diseases. Considering the recall and reporting bias in reported morbidity data, it might be concluded that prevalence of chronic diseases among women in some provinces, particularly Bushehr province, might be higher than what has been reported. Hence, disparities in this outcome are most likely worse than the Gini coefficient has shown.

Considering the limitations of the present study and the need for sound evidence on disparities in women's health, it is be suggested that the following issues be addressed in future studies: (a) analysis of inequalities in women's health using individual data, (b) applying other techniques for inequality measurement to obtain more robust results, (c) a comparison of inequalities in health determinants between men and women, (d) use of more valid indicators in inequality measurement of health outcomes.

CONCLUSIONS

In this study, we examined the provincial disparities in health determinants and outcomes of women based on Moss's framework among Iranian women. Disparity in five categories including "geopolitical environment," "culture, norms, sanctions," "women's roles in reproduction and production," "health-related mediators," and "health outcome" was analyzed. Determinants of women's health included cigarette smoking, hookah consumption, knowledge about HIV/AIDS, utilization of internet or computer, pregnancy care by the SBA, and delivery by SBA had the highest provincial disparity among other factors. In conclusion, it can be asserted that provincial disparities in health determinants and outcome of women are related to the biggest and most critical situations related to factors such as lifestyle, health behavior, health knowledge, and health-care services availability and decision and should therefore be considered by policymakers when in the course of policymaking and planning. As noted by the World Health Organization, the data on women's health are inadequate and often unreliable for policy making, particularly in developing countries. Therefore, this study can be considered one of the few published studies on inequity of Iranian women's health. Our study presents a comprehensive framework

for assessing inequality in women's health at the regional level, particularly for developing countries.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Received: 21 Feb 16 **Accepted:** 27 Nov 16
Published: 02 Mar 17

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