



Fertility intentions of HIV patients referred to behavioural clinics of Kerman University of Medical Sciences

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Abstract

Background & Aims: Nowadays, with the widespread use of antiretroviral therapy (ART), the death rate from acquired immunodeficiency syndrome (AIDS) has significantly reduced. This has led to a reassessment of pregnancy and increased fertility intention among HIV-positive patients. The aim of this study was to determine the fertility intentions and the factors affecting them in HIV-infected patients.

Materials & Methods: This cross-sectional descriptive-analytic study was conducted on all patients (103 patients selected using convenience sampling) who referred to the Behavioural Disorders Counselling Centre in Kerman province from 2017 to 2021. Data were collected using a questionnaire and analysed using Chi-square and logistic regression tests. A statistical significance level was considered at $p < 0.05$.

Results: Among the patients, 38 (36.9%) were female and 65 (63.1%) were male. Seventy-five (72.8%) patients expressed fertility intentions. Fertility intentions were higher among male patients compared to female patients (47 versus 28). Patients who had knowledge of HIV transmission methods were 3.28 times more likely to have fertility intentions than those without such knowledge. There was a significant relationship between knowledge of HIV transmission methods and fertility intentions (CI: 1.33-8.08, OR: 3.28).

Conclusion: Counselors are recommended to have enough psychological knowledge to encourage patients to seek counseling. Also, a plan is needed to encourage HIV-infected patients to refer to a relevant specialist to have a healthy child under the guidance of that specialist.

Keywords: Behavioural Clinic, Fertility Intentions, HIV-positive individual

Received 21 February 2024; accepted for publication 01 July 2024

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Introduction

Human Immunodeficiency Virus (HIV) infection was first recognized in the United States about 40 years ago. Its definition has been gradually changed from a deadly disease to a chronic disease that can be treated and controlled (1, 2).

A recent study published in 2024 indicates that the relative proportion of deaths due to non-AIDS causes among people with HIV, including cardiovascular disease (CVD), non-AIDS-defining malignancies (NADM) or liver disease, may be increasing, partly due to the aging population of people with HIV (3). The ageing of HIV-infected patients poses challenges related to age-related diseases (4, 5).

Evidence shows that despite prevention measures and treatment with antiretroviral therapy (ART), it is estimated that 36.2 million adults and 1.8 million children under 15 were infected with HIV (6). According to the report from the Iranian national HIV registry system, 38,966 people were diagnosed with HIV infection by the end of 2018. The majority were male (83%), aged between 16 and 40 years old (67.6%), and 17% were female (7). According to the latest statistics from the Ministry of Health and Medical Education of Iran, by the end of September 2017, the number of HIV-positive patients in Iran was about 36,571 people (83% male and 17% female), with 53% of patients aged 21-35 years. Of all cases, 65.4% were due to sharing infected syringes by drug users, and 20.1% were due to uncontrolled sexual relationships.

The pattern of new HIV-positive cases has shifted from sharing infected syringes among drug users to sexual relationships, with about 32% of new HIV infections among injecting drug users and 47.1% among those who had high-risk sexual behaviors. The risk of mother-to-child transmission (MTCT) of HIV from HIV-positive mothers who are unaware of their disease is approximately 35-40%. However, in mothers who undergo cesarean section, feed their babies using powdered milk, and receive treatment, the risk of MTCT of HIV is less than 2% (7).

In the past (1996-1998), HIV infection was considered as an end stage disease and a major reproductive barrier, and death of patients was considered inevitable (8, 9). Accordingly, life expectancy in HIV-infected patients was approximately 10 months in 1987. For this reason, HIV-infected patients were prohibited from pregnancy and in the case of pregnancy, abortion in the first trimester of pregnancy was proposed. The introduction of Antiretroviral therapy (ART) has significantly improved the health of patients and has increased their lifespan, and subsequently, an increase in life expectancy of these patients (10). This led to the revision of pregnancy, on the other hand, perinatal transmission of the virus was significantly reduced (11).

The fertility intention of HIV-positive patients is growing. In general, women consider pregnancy as an evidence of being a woman, therefore, healthcare providers in the counseling centers should respect and respond to the needs of patients, as well as giving necessary information to patients to help them make the best decision about their fertility method (12, 13).

At the International Conference on Population and Development (ICPD, 1994), members stated the need to pay particular attention to reproductive health services and global access to reproductive health indicators, and the reduction of the prevalence of HIV/AIDS transmission was to be among the Millennium Development Goals (MDGs). The rights, needs, and interests in sexual and reproductive health of HIV-infected patients are similar to those of uninfected people, but the biological differences of these patients differentiate them from uninfected people and require special attention (14). Therefore, the purpose of this study was to determine the fertility intentions and factors affecting them in HIV-infected patients.

Materials & Methods

Sampling:

This cross-sectional descriptive-analytic study was

conducted on all HIV-positive patients who referred to the Behavioral Disorders Counseling Center in Kerman province. This center, located in Kerman province, provides educational services, counseling, preventive care, and treatment for high-risk groups and infected patients. Additionally, educational programs for the general public are available at this center.

Participants were recruited using convenience sampling. The purpose of the study was explained to each participant, and they were assured of the anonymity of the information obtained. Those who accepted and orally consented to participate were included in the study and completed the questionnaire. A total of 103 patients were included in this study from 2017 to 2021.

Data Collection:

Data were collected using a questionnaire which included three parts. This questionnaire was previously used in a study conducted by Hajizadeh et al. at Tehran University of Medical Sciences (15).

The first part of the questionnaire includes demographic information (age, gender, marital status, educational status, duration of diagnosis, antiretroviral therapy duration, health status of the child (healthy or HIV-infected), knowledge of prevention measures, addiction history, attending training classes, family knowledge of the disease, and health status of couples). The second part includes questions related to fertility intentions, and the third part includes questions related to the counselor's awareness of the fertility intentions of patients.

The questionnaire was formerly used in a similar study, and its validity and reliability were previously confirmed through test-retest and inter-observer reliability methods (15). In the present study, the reliability of the questionnaire, using test-retest, was 0.83.

Data were collected through structured interviews to obtain exact information and avoid missing any information, so that all eligible people of childbearing age were interviewed by the researcher, and each questionnaire was completed by asking questions by the interviewer. Since all the questionnaires were

completed in the presence of the interviewers, all questions were fully answered, and no item was left unanswered.

To explain the study protocols, a briefing session was held with the researcher and interviewer before the questionnaires were completed, where the research objectives and the confidentiality of personal information were explained according to ethical standards. Anonymous questionnaires and those completed by participants who withdrew from the study for any reason were excluded.

For ethical considerations, the objectives of the study were explained in detail to participants, oral consent was obtained, the right to withdraw was acknowledged, and the confidentiality of data was guaranteed.

Data Analysis:

Data were analyzed using Stata 14 (Stata Corp., College Station, TX, USA). To determine the relationship between variables and odds ratios, chi-square and logistic regression tests were used accordingly. In all tests, the level of statistical significance was set at $P < 0.05$.

Results

It was revealed that 38 (36.9%) HIV-infected patients were female and 65 (63.1%) were male, and 75 (72.8%) patients had fertility intentions. Additionally, 66 (64.1%) patients were married, and 37 (35.9%) were single. Among the patients, 65 (63.1%) were over 30 years old, and 14 (13.6%) had HIV-positive children. It was also revealed that 72 (69.9%) patients had less than a high school education, and 31 (30.1%) had more than a high school education. There was a statistically significant relationship between gender and age, duration of diagnosis, history of antiviral drug use, educational status, history of drug use, attending training classes, and family knowledge of the disease ($p < 0.05$). However, there was no significant relationship between gender and having an HIV-infected child, health status of the spouse, and fertility intentions (Table 1).

Table 1. The relationship between study variables and gender of HIV-infected patients

		Gender		Total	P*
		Female	Man		
Marital Status	Single	7 (18.4%)	30 (46.2%)	37 (35.9%)	0.005
	Married	31 (81.6%)	35 (53.8%)	66 (64.1%)	
Age	< 30 years	19 (50%)	19 (29.2%)	38 (36.9%)	0.03
	> 30 years	19 (50%)	46 (70.8%)	65 (63.1%)	
Diagnosis duration	< 2 years	21 (55.3%)	18 (27.7%)	39 (37.9%)	0.005
	> 2 years	17 (44.7%)	47 (72.3%)	64 (62.1%)	
History of ART use	No	16 (42.1%)	8 (12.3%)	24 (23.3%)	0.001
	Yes	22 (57.9%)	57 (87.7%)	79 (76.7%)	
status of child (HIV-infected)	No	35 (92.1%)	54 (83.1%)	89 (86.4%)	0.19
	Yes	3 (7.9%)	11 (16.9%)	14 (13.6%)	
Education	< high school education	17 (44.7%)	55 (84.6%)	72 (69.9%)	0.000
	> high school education	21 (55.3%)	10 (15.4%)	31 (30.1%)	
Knowledge of HIV ways of transmission	No	16(42.1%)	25 (38.5%)	41 (39.8%)	0.71
	Yes	22 (57.9%)	40 (61.5%)	62 (60.2%)	
Addiction history	No	11 (28.9%)	7 (10.8%)	18 (17.5%)	0.01
	Yes	27 (71.1%)	58 (89.2%)	85 (82.5%)	
Attendance in training class	No	9 (23.7%)	36 (55.4%)	45 (43.7%)	0.002
	Yes	29 (76.3%)	29 (44.6%)	58 (56.3%)	
Family knowledge of the disease	No	9 (23.7%)	29 (44.6%)	38 (36.9%)	0.03
	Yes	29 (76.3%)	36 (55.4%)	65 (63.1%)	
Health status of spouse	Uninfected	15 (48.4%)	21 (55.3%)	36 (52.2%)	0.5
	Infected	16 (51.6%)	17 (44.7%)	33 (47.8%)	
Fertility intention	No	10 (26.3%)	18 (27.7%)	28 (27.2%)	0.88
	Yes	28 (73.7%)	47 (72.3%)	75 (72.8%)	

Chi-square analysis, Significance at $P < 0.05$

Results showed that fertility intentions in male patients were higher than female patients (47 versus 28). Fertility intention in married patients was 21% higher than single patients. Patients aged less than 30 years had fertility intentions 3.9 times higher than those more than 30 years, indicating a statistically significant relationship between age and fertility intention (CI: 1.59-9.87, $P < 0.05$).

Fertility intentions in patients with a diagnosis duration of more than 2 years were 8% higher than those with a diagnosis duration of less than 2 years. Fertility intention in patients with a history of antiviral

drug use was 47% higher than those without such a history. Additionally, it was revealed that patients with more than a high school education had higher fertility intentions than those with less than a high school education.

Fertility intentions in drug users were 72% lower than in those without a history of drug use. Patients who attended training classes had lower fertility intentions than those who did not attend training classes.

Fertility intentions in patients whose families were aware of their disease were 7% lower than in those

whose families were not aware. Patients with an infected spouse had fertility intentions 2.54 times higher than those with an uninfected spouse. Fertility intentions in patients who had knowledge of HIV transmission methods were 3.28 times higher than

those without such knowledge o, indicating a significant relationship between knowledge of HIV transmission methods and fertility intention (CI: 1.33-8.08, OR: 3.28) (Table 2).

Table 2. The relationship between study variables and fertility intention in the HIV-infected patients

	Fertility intention		(95%CI) OR	p*
	No N (%)	Yes N (%)		
Gender				
Female	10 (35.71)	28 (37.33)	(0.37-2.30) 0.93	0.88
Male	18 (64.29)	47 (62.67)		
Marital Status				
Single	11 (39.29)	26 (34.67)	(0.49-2.98) 1.21	0.66
Married	17 (60.71)	49 (65.33)		
Age				
< 30 years	17 (60.71)	21 (28)	(1.59-9.78) 3.9	0.003
> 30 years	11 (29.29)	54 (72)		
Diagnosis duration				
< 2 years	11 (39.29)	28 (37.33)	(0.44-2.64) 1.08	0.85
> 2 years	7 (60.71)	47 (62.67)		
History of ART use				
No	8 (28.57)	16 (21.33)	(0.54-3.96) 1.47	0.44
Yes	20 (71.43)	59 (78.67)		
Education				
< high school education	23 (82.14)	49 (65.33)	(0.83-7.17) 2.44	0.1
> high school education	5 (17.86)	26 (34.67)		
Addiction history				
No	5 (7.1)	16 (21.3)	(0.06-1.32) 0.22	0.1
Yes	26 (92.9)	59 (78.7)		
Attendance in training class				
No	12 (42.86)	33 (44)	(0.39-2.29) 0.95	0.9
Yes	16 (57.14)	42 (56)		
Family knowledge of the disease				
No	10 (35.7)	28 (37.33)	(0.37-2.30) 0.93	0.88
Yes	18 (64.29)	47 (62.67)		
Health status of spouse				
Uninfected	13 (68.42)	23 (46)	(0.83-7.76) 02.54	0.1
Infected	6 (31.58)	27 (54)		
Knowledge of HIV ways of transmission				
No	17 (60.7)	24 (32)	(1.33-8.08) 3.28	0.01
Yes	11 (39.3)	51 (68)		

Logistic regression test, Significance at P < 0.05

Evaluation of the Cause of Fertility

Intention/Unwillingness to Have a Child:

Findings show that 23 (30.7%) patients expressed a desire to have a child due to not having children, and 17 (22.7%) wanted to strengthen the basis of their family and emotional relationship with their spouse. In addition, 15 (53.6%) patients did not have any fertility intentions and expressed that the fear of transmitting the infection to their spouse was the primary cause of their unwillingness to have a child.

Evaluation of Patients' Willingness to Inform Counselors about Their Fertility Intention:

Results highlight that 50 (48.5%) patients informed the counsellor about their fertility intention while, 53 (51.5%) were reluctant to consult with counsellors. Among the reluctant patients, 20 (37.7%) avoided consultation due to fear of negative reactions from counsellors, believing that HIV-infected patients should not have a child. However, 36 (72%) of the patients who did inform counsellors about their fertility intention were advised by the counsellors that HIV-infected patients can also become pregnant.

Discussion

HIV-infected patients, like the rest of the community, have the right to have children. Therefore, in this study, the fertility intention of HIV-infected patients, as well as the relationship between fertility intention and the factors affecting it, were investigated.

According to the results, 72.8% of the patients intended to have a child, indicating a high fertility intention among patients. Specifically, 30.7% of the patients wanted a child because they did not have one, and 22.7% desired a child to strengthen the basis of family and emotional relationships with their spouse. These findings are consistent with the results of studies conducted in India and Tehran (15, 16).

On the other hand, more than half of the patients did not have fertility intentions, and expressed that the fear of transmitting the infection to their spouse was the cause of their unwillingness to have a child. This finding aligns with the results of other studies (17).

It was revealed that men had less fertility intention compared to women. This can be attributed to the maternal emotions of women who, despite any disease, tend to want to have a child. This finding is consistent with the results of a study by Matthews et al. in South Africa (18).

The fertility intention in patients under 30 years of age was 3.9 times higher than those over 30 years, which can be due to their lesser experience and the acceptance of the disease by these patients. If patients accept their disease, they try to increase their knowledge about it. Therefore, by understanding ways of mother-to-child transmission of HIV or its prevention methods, these patients will play an important role in preventing the spread of the disease and its transmission.

According to the results, there is a significant relationship between knowledge about HIV transmission methods and fertility intention. Patients who had more knowledge about the transmission of the infection had higher fertility intentions. The participants in this study had moderate knowledge about the ways of HIV transmission, which is higher than the knowledge levels in middle and lower-income countries regarding their disease, ways of HIV transmission, and fertility intention (19, 20).

More than half of the patients did not inform the counselor about their fertility intention, with 62.3% preferring not to disclose this information. This suggests that more attention should be paid to the psychological needs of the patients, and they should be reassured that counselors can provide necessary information, making it easier to decide. Similar studies conducted in Brazil, Ethiopia, and Argentina, revealed that patients are rarely willing to consult a counselor about pregnancy, and most were worried about the counselor's recommendation. In other words, they thought the counselor would advise that HIV-infected people should not become pregnant (21, 22). In another study by Hajizadeh et al. in Tehran, the majority of patients informed counselors about their fertility intentions, indicating a trust between patients and counselors at the counseling center in this city (15).

The discrepancy in the results can be due to differences in the knowledge of patients and counselors about the disease, the behavior of counselors towards patients, and the facilities of centers that provide support services.

Fertility intention in patients whose families were aware of their disease was 7% lower than those who did not inform their families. This could be due to this fact that their families did not have enough knowledge about the disease. Therefore, along with the training of patients, it is necessary to plan some programs for training the patients' families to improve their knowledge about this disease.

On the other hand, there was a significant relationship between family knowledge about the disease and gender. Most female patients' families were aware of their disease, which may be because women are more likely to talk with and share their feelings with their families. This is consistent with the results of a study conducted by Mmbaga et al. in Tanzania (23). The use of ART led to increased fertility intention, and this finding could be related to this fact that the use of antiviral drugs was due to the consultation of patients, who were under treatment, with a counselor, therefore, the fertility intention of these patients was high. This is consistent with the results of a study by Mekonnen et al. in Ethiopia, indicating that ART use increases fertility intention in HIV-infected patients (24). This study has its own limitations. First, there might be a recall bias regarding participants. Second, the methodological nature of the cross-sectional study design limited the causality inference of the study variables.

Conclusion

The relatively similar fertility intention in men and women shows that both male and female patients had an intention to have children. Therefore, they should refer to a relevant specialist to have a healthy child under the specialist's guidance. Generally, the visit of these children by a specialist in time of a crisis is also recommended (25). Knowledge about the ways of infection transmission has a significant effect on the

fertility intention of patients. In HIV-infected patients with more knowledge, the risk of mother-to-child transmission of HIV will be significantly reduced. Holding appropriate training classes for patients to introduce new and advanced prevention methods of HIV transmission to their spouses, can help promote their knowledge. There is also a need to plan some programs for educating patients' families to improve their attitudes towards the disease along with educating patients. Additionally, counselors in behavioral disorder counseling centers should understand that their role in changing the attitudes of patients is very important and effective. Counselors are recommended to have enough psychological knowledge to encourage patients to seek counseling.

Acknowledgments

The authors would like to express their gratitude to all the researchers who helped us perform this study. Special thanks to the Shafa Development Unit, Shafa Hospital, Kerman, for providing the required services at all stages of the study.

Authors' Contributions

All authors were involved in the preparation of this article. SMSA and AB initiated the study and conducted the conception and design of the study. MM and MD were responsible for the definition of intellectual content and literature search. SMSA, AB, MM, and MD contributed to the acquisition, analysis, and interpretation of data. SMSA wrote and drafted the manuscript, and AB, MD, and MM reviewed and edited it.

Data Availability

The raw data supporting the conclusions of this article are available from the authors upon reasonable request.

Conflict of Interest

The authors declare that they have no conflict of interests.

Ethical Statement

The protocols of this research were approved by the Ethics Committee of Kerman University of Medical Sciences (Code No: IR.KMU.REC.1395.843).

Funding/Support

This study was approved by Kerman University of Medical Sciences (grant No: 95000538). It is important to mention that the content, or any kind of conclusion is subjective and reflects the authors' point of view, not the policies of the university.

References

1. May MT, Gompels M, Delpech V, Porter K, Orkin C, Kegg S, et al. Impact on life expectancy of HIV-1 positive individuals of CD4+ cell count and viral load response to antiretroviral therapy. *AIDS* (London, England). 2014;28(8):1193-202. <https://doi.org/10.1097/QAD.000000000000243>
2. Sant'Anna ACC, Fleury Seidl EM. Efeitos da condição sorológica sobre as escolhas reprodutivas de mulheres HIV positivas. *Psicologia: Reflexão e crítica*. 2009;22(2). <https://doi.org/10.1590/S0102-79722009000200011>
3. Tusch E, Ryom L, Pelchen-Matthews A, Mocroft A, Elbirt D, Oprea C, et al. Trends in mortality in people with HIV from 1999 to 2020: a multi-cohort collaboration. *Clinical Infectious Diseases*. 2024;ciae228.
4. Brooks JT, Buchacz K, Gebo KA, Mermin J. HIV infection and older Americans: the public health perspective. *American journal of public health*. 2012;102(8):1516-26. <https://doi.org/10.2105/AJPH.2012.300844>
5. Capriotti T. HIV/AIDS: An Update for Home Healthcare Clinicians. *Home healthcare now*. 2018;36(6):348-55. <https://doi.org/10.1097/NHH.0000000000000706>
6. unaids. Islamic Republic of Iran 2016 [Available from: <http://www.unaids.org/en/regionscountries/countries/islamicropublicofiran>.
7. Center for Communicable Diseases Control, Ministry of Health and Medical Education. Latest statistics on HIV infection in Islamic Republic of Iran, April to June 2017. 2018.
8. Barreiro P, Duerr A, Beckerman K, Soriano V. Reproductive options for HIV-serodiscordant couples. *AIDS Rev*. 2006;8(3):158-70.
9. Control CfD. Recommendations for assisting in the prevention of perinatal transmission of human T-lymphotropic virus type III/lymphadenopathy-associated virus and acquired immunodeficiency syndrome. *MMWR Morbidity and mortality weekly report*. 1985;34(48):721.
10. Wada N, Jacobson LP, Cohen M, French A, Phair J, Muñoz A. Cause-specific life expectancies after 35 years of age for human immunodeficiency syndrome-infected and human immunodeficiency syndrome-negative individuals followed simultaneously in long-term cohort studies, 1984-2008. *American journal of epidemiology*. 2013;177(2):116-25. <https://doi.org/10.1093/aje/kws321>
11. Gilling-Smith C, Smith JR, Semprini AE. HIV and infertility: time to treat: There's no justification for denying treatment to parents who are HIV positive. *British Medical Journal Publishing Group*; 2001. <https://doi.org/10.1136/bmj.322.7286.566>
12. Chen JL, Phillips KA, Kanouse DE, Collins RL, Miu A. Fertility desires and intentions of HIV-positive men and women. *Family planning perspectives*. 2001:144-65. <https://doi.org/10.2307/2673717>
13. Pennings G. The physician as an accessory in the parental project of HIV positive people. *Journal of medical ethics*. 2003;29(6):321-4. <https://doi.org/10.1136/jme.29.6.321>
14. Gruskin S, Ferguson L, O'Malley J. Ensuring sexual and reproductive health for people living with HIV: an overview of key human rights, policy and health systems issues. *Reproductive health matters*. 2007;15(sup29):4-26. [https://doi.org/10.1016/S0968-8080\(07\)29028-7](https://doi.org/10.1016/S0968-8080(07)29028-7)
15. Hajizadeh S, Nedjat S, Majdzadeh R, Mohraz M, Setayesh HR, Gooya MM. Fertility Intentions of HIV Patients who Referred to Behavioral Clinics of Universities of Medical Sciences in Tehran. *Journal of Isfahan Medical School*. 2012;29(167).
16. Kanniappan S, Jeyapaul M, Kalyanwala S. Desire for motherhood: exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood.

- AIDS care. 2008;20(6):625-30.
<https://doi.org/10.1080/09540120701660361>
17. Medicine ECotASfR. Human immunodeficiency virus and infertility treatment. *Fertility and Sterility*. 2010;94(1):11-5.
<https://doi.org/10.1016/j.fertnstert.2010.01.077>
 18. Matthews LT, Smit JA, Moore L, Milford C, Greener R, Mosery FN, et al. Periconception HIV Risk Behavior Among Men and Women Reporting HIV-Serodiscordant Partners in KwaZulu-Natal, South Africa. *AIDS and behavior*. 2015;19(12):2291-303.
<https://doi.org/10.1007/s10461-015-1050-x>
 19. Kawale P, Mindry D, Phoya A, Jansen P, Hoffman RM. Provider attitudes about childbearing and knowledge of safer conception at two HIV clinics in Malawi. *Reproductive health*. 2015;12:17.
<https://doi.org/10.1186/s12978-015-0004-0>
 20. Litwin LE, Makumbi FE, Gray R, Wawer M, Kigozi G, Kagaayi J, et al. Impact of availability and use of ART/PMTCT services on fertility desires of previously pregnant women in Rakai, Uganda: a retrospective cohort study. *Journal of acquired immune deficiency syndromes (1999)*. 2015;69(3):377.
<https://doi.org/10.1097/QAI.0000000000000612>
 21. Dabash R. Sexual and reproductive health needs of women and adolescent girls living with HIV. *Research report on qualitative findings from Brazil Ethiopia and the Ukraine*. 2006.
 22. Gogna ML, Pecheny MM, Ibarlucía I, Manzelli H, López SB. The reproductive needs and rights of people living with HIV in Argentina: health service users' and providers' perspectives. *Social science & medicine*. 2009;69(6):813-20.
<https://doi.org/10.1016/j.socscimed.2009.06.002>
 23. Mmbaga EJ, Leyna GH, Ezekiel MJ, Kakoko DC. Fertility desire and intention of people living with HIV/AIDS in Tanzania: a call for restructuring care and treatment services. *BMC public health*. 2013;13(1):86.
<https://doi.org/10.1186/1471-2458-13-86>
 24. Mekonnen H, Enquesselassie F. Effect of antiretroviral therapy on changes in the fertility intentions of human immunodeficiency virus-positive women in Addis Ababa, Ethiopia: a prospective follow-up study. *Epidemiology and health*. 2017;39:e2017028-e.
<https://doi.org/10.4178/epih.e2017028>
 25. Houshmand H, Talebi M. Investigating risk factors related to asthma in children before school age in rural and urban areas of West Azerbaijan province. *Health Science Monitor* 2023; 2 (4) :249-57.
<https://doi.org/10.61186/hsm.2.4.249>