SciencePG
Science Publishing Group

Research Article

The Prevalence of Cervical Neoplastic Changes Among Sudanese Community Without Settled Screening Program

Mahadi Musa Mohammed Abdallah[1] , **Nawal Ali Ahmed Mohamed**[2, 3, 4] ,
Inaam Eloshary Mohammed Hayaty[5] , **Ahmed Abdelkerim Ahmed Abdallah**[2, 6] ,
Salah Eldinn Eltahir Gumaa[7, 8, 9] , **Rogeia Mahmoud Niyle**[10, 11, 12] ,
Sahar ALshareef Hasbsedo[13, 14] , **Hassan Yousif Adam Regal**[7, 15, 16] ,
Khalil Ali Ibraheim[3, 17, 18] , **Ekhlas Alrasheid Abuelfadol**[3, 19] ,
Hussain Gadelkarim Ahmed[20, 21, *]

[1]Ministry of Health, El-Obeid Obstetrics and Gynecology Teaching Hospital, El-Obeid, Sudan

[2]Department of Obstetrics and Gynecology, Faculty of Medicine, University of Kordofan, El-Obeid, Sudan

[3]Department of Obstetrics and Gynaecology, Shikan College, El-Obeid, Sudan

[4]Arous Elrimal Obstetrics, Gynecology, and Laparoscopy Surgery Clinic, El-Obeid, Sudan

[5]Department of Obstetrics and Gynecology, El-Obeid Obstetrics and Gynecology Teaching Hospital, El-Obeid, Sudan

[6]Alfayhaa Obstetrics, Gynecology, and Laparoscopy Surgery Clinic, El-Obeid, Sudan

[7]Khair-Elelag Clinic, El-Obeid, Sudan

[8]Department of Radiology, El-Obeid Teaching Hospital, El-Obeid, Sudan

[9]Department of Radiology, El-Obeid International Hospital, El-Obeid, Sudan

[10]Department of Medicine, Faculty of Medicine, University of Kordofan, El-Obeid, Sudan

[11]Department of Dermatology, El-Obeid Teaching Hospital, El-Obeid, Sudan

[12]Department of Dermatology, El-Obeid International Hospital, El-Obeid, Sudan

[13]Department of Ophthalmology, El-Obeid Teaching Hospital, El-Obeid, Sudan

[14]Department of Ophthalmology, El-Obeid International Hospital, El-Obeid, Sudan

[15]Department of Parasitology & Medical Entomology, Faculty of Medical Laboratory Sciences, Kordofan University, El-Obeid, Sudan

[16] Department of Medical Laboratory, Faculty of Technology Science, El-Obeid, Sudan

[17]Department of Surgery, Faculty of Medicine, University of Kordofan, El-Obeid, Sudan

[18]Doctor Khalil Ophthalmology Center, El-Obeid, Sudan

[19]Department of hematology, Faulty of Medical Laboratory Sciences, University of Kordofan, El-Obeid, Sudan

[20]Prof Medical Research Consultancy Center- MRCC, El-Obeid, Sudan

[21]Department of Histopathology and Cytology, FMLS, University of Khartoum, Khartoum, Sudan

*Corresponding author: hussain@profmrcc.org (Hussain Gadelkarim Ahmed), hussaingad5@gmail.com (Hussain Gadelkarim Ahmed)

Abstract

Background: While cervical cancer is decreasing in most countries that have undertaken long-term screening programs, the incidence is increasing in developing nations with low resources. As a result, the current study sought to investigate the incidence of cervical neoplastic alterations in the Sudanese community in the absence of a formal screening program. Methodology: This is a descriptive longitudinal study conducted at the Obst. & Gyn. hospital in El-Obeid, North Kordofan State, Sudan, from January 2021 to December 2022. This screening involved around 120 volunteers. Results: In this study, 14% of participants had neoplastic alterations. Positive cases were highest in the 31-35 age group (29.4%), followed by 36-40 and ≤25 age groups (23.5%). The majority of positive cases (58.8%) were from metropolitan areas. The risk of neoplastic alterations is connected with urban residency; RR (95%CI) = 2.558 (1.050-6.235), P-value < 0.03. Approximately 11.1% of illiterate participants had neoplastic alterations, as did approximately 25% of those with a basic degree of education. The risk associated with a basic education level is 2.2750 (95% CI) (0.9550 to 5.4197), P = 0.0635. Conclusion: Cervical neoplastic alterations are common in northern Kordofan, yet there are few screening programs. Cervical neoplastic alterations are substantially higher in the metropolitan population.

1. Introduction

Cervical cancer is one of the most common female cancers, accounting for 6.5% of total female malignancies worldwide [1]. It was shown that the vast majority of cervical cancer incidences occur in underdeveloped nations due to a lack of efficient prevention and early detection measures [2]. Human papillomavirus (HPV) is the most likely cause of cervical cancer, accounting for 95% of cases. However, nations that have initiated immunization against potentially hazardous HPV subtypes have seen a drop in the prevalence of cervical cancer [3]. High-risk HPV subtypes are 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59. HPV subtypes 16 and 18 are responsible for approximately 70% of cervical cancer incidences [4].

However, there is a complete lack of data on the status of cervical cancer in Sudan. During our intensive search, we discovered only one conference proceeding document revealing that between 2003 and 2013, cervical cancer accounted for 12-16% of all female cancers [5]. To our knowledge, Sudan has no government programs for cervical cancer prevention or early detection. Such conditions may increase the late presentation of patients with poor outcomes, resulting in lower survival rates [6]. As a result, the current study sought to determine the incidence of cervical neoplastic alterations among Sudanese communities without a formal screening program.

2. Materials and Methods

This is a descriptive longitudinal study that took place at the Obst. & Gyn. hospital in El-Obeid, North Kordofan State, Sudan, between January 2021 and December 2022. This screening involved around 120 volunteers. Following the announcement of the program in the local media, responders went to the screening center, consented, were interviewed, and then the test was administered. The sample represented a complete coverage of the respondents during the specified period.

2.1. Visual Inspection Acetic Acid Test (VIA-Test)

The VIA-test was carried out to all participants as follows: All patients had a speculum examination followed by a cervical smear with a wooden spatula and cotton swab. Meanwhile, a thick cotton swab was used to apply acetic acid 5% to the cervix, followed by a 1-minute direct visual inspection with a white 100-Watt halogen lamp. The test is classified as positive if an acetowhite area is visible in the transformation zone and negative if no change is noticed. This examination was performed by two certified senior obstetrics and gynecology assistants.

Statistician Analysis: Data was initially prepared as a data sheet before being entered into a computer software statistical package for social sciences (SPSS) (Version 24, Chicago, USA). Frequencies, percentages, cross-tabulation, and the chi square test were calculated. The P-value was obtained using a 95% confidence interval (CI). P-values < 0.05 were considered statistically significant.

2.2. Informed Consent

Each participant was asked to sign a written ethical consent before the interview.

2.3. Ethical Approval

The protocol of this study was approved by the human Research ethics committee (HREC) at Prof. Medical Research Center-MRCC. Approval Number:
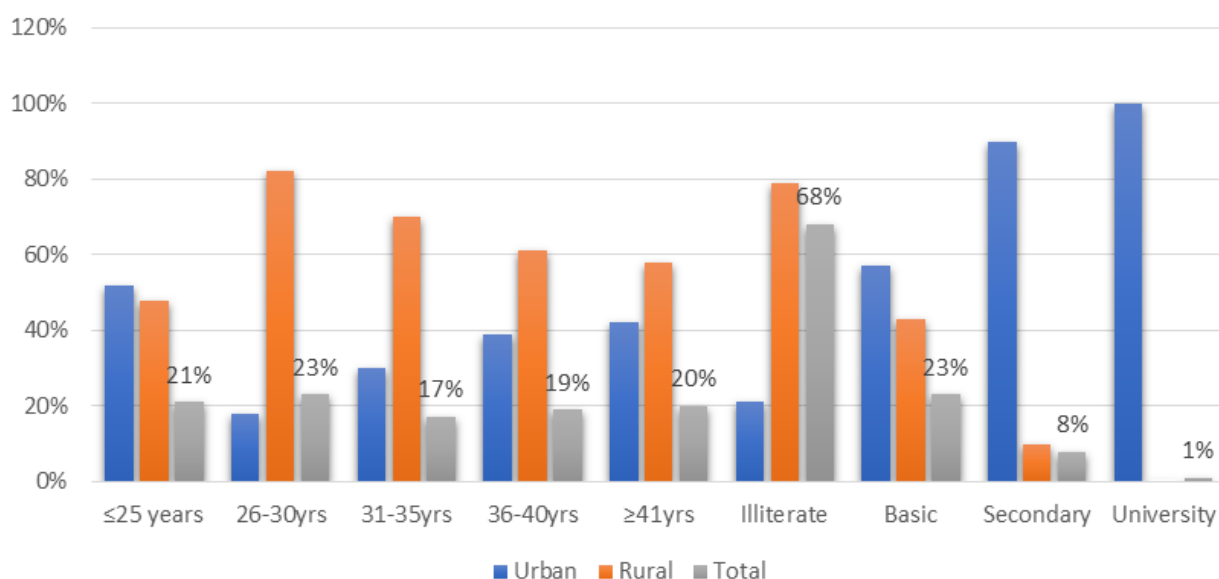
3. Results

This study examined 120 women aged 18 to 60, with an average age of 34 years. The majority of participants in this study were aged 26-30 years, followed by ≤25 years and ≥41 years, with 28/120 (23.3%), 25 (20.8%), and 24 (20%), respectively. Of the 120 participants, 77 (64%) were from rural areas, with the remaining 43 (36%) from metropolitan areas. The bulk of rural participants were in the age range of 26-30 years. According to Table 1 and Figure 1, the majority of urban contributors (23/77, 29.9%) were under the age of 25 (13/43, 30.2%).

The majority of the contributors were illiterates, followed by those with basic and secondary education, accounting for 81/120 (67.5%), 28 (23.3%), and 10 (8.3%), respectively. Illiterates make up the majority of both residence groups, as seen in Table 1 and Figure 1. All of the study participants were married and had a poor socioeconomic background.

Table 1. Distribution of the study population by demographic characteristics.

Variable	Urban	Rural	Total
Age			
≤25 years	13	12	25
26-30	5	23	28
31-35	6	14	20
36-40	9	14	23
≥41	10	14	24
Total	43	77	120
Education			
Illiterate	17	64	81
Basic	16	12	28
Secondary	9	1	10
University	1	0	1
Total	43	77	120

Figure 1. Description of the participants by demographical characteristics.

Table 2 and Figure 2 describe the study subjects' distribution based on VIA test results and demographic characteristics. In this study, 17/120 people tested positive for VIA, accounting for 14%. The majority of positive cases were among those aged 31-35 years. 5/17 (29.4%), 36-40, and ≤25 years 4 (23.5%). The majority of positive cases were from metropolitan regions, accounting for 10/17 (58.8%), with the remaining 7 (41.2%) from rural locations. The risk of a positive VIA-test is connected with urban living, with a relative risk (RR) of 2.558 (1.050-6.235) and a P-value of <0.03.

About 9/81 (11.1%) of illiterate participants were positive, as were approximately 7/28 (25%) of those with a basic level of education. The risk associated with a basic education level is 2.2750 (95% CI) (0.9550 to 5.4197), P = 0.0635.

Table 2. Distribution of the study subjects by presence, absence of neoplastic changes, and demographical features.

Variable	Absent	Present	Total
Age			
≤25 years	21	4	25
26-30	25	3	28
31-35	15	5	20
36-40	19	4	23
≥41	23	1	24
Total	103	17	120
Residence			
Urban	33	10	43
Rural	70	7	77
Total	103	17	120
Education			
Illiterate	72	9	81
Basic	21	7	28
Secondary	9	1	10
University	1	0	1
Total	103	17	120

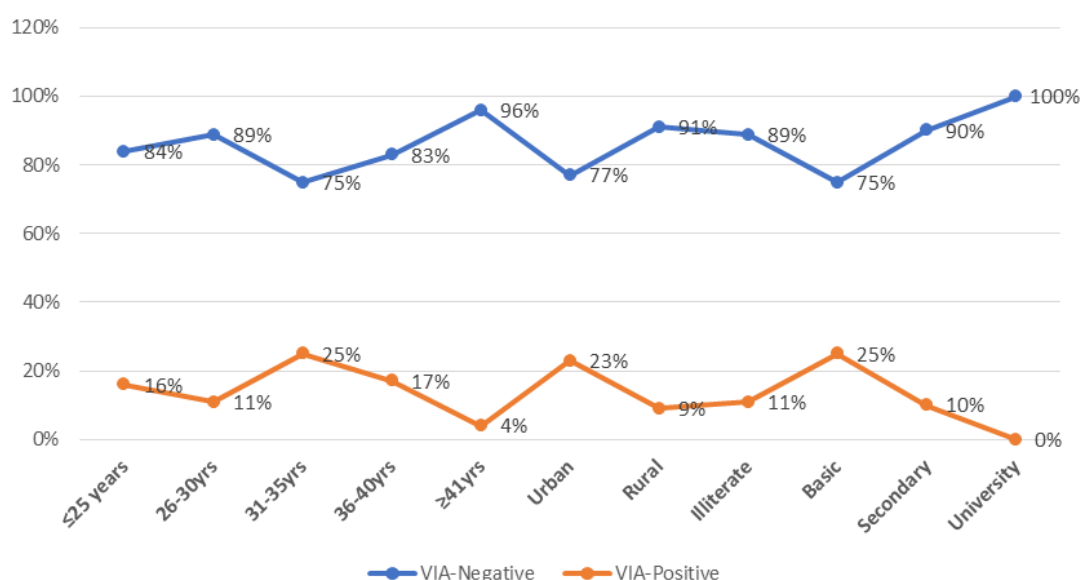

Figure 2. Description of the study subjects by VIA test and demographical features.

Table 3 and Figure 3 presented the distribution of research individuals based on neoplastic alterations and clinical results. The majority of patients (76.5%) were classified as CIN2 13/17. The risk associated with CIN2 among the screened population was 21.7344 (8.0768 to 58.4865) with a 95% confidence interval (95%CI), P < 0.0001.
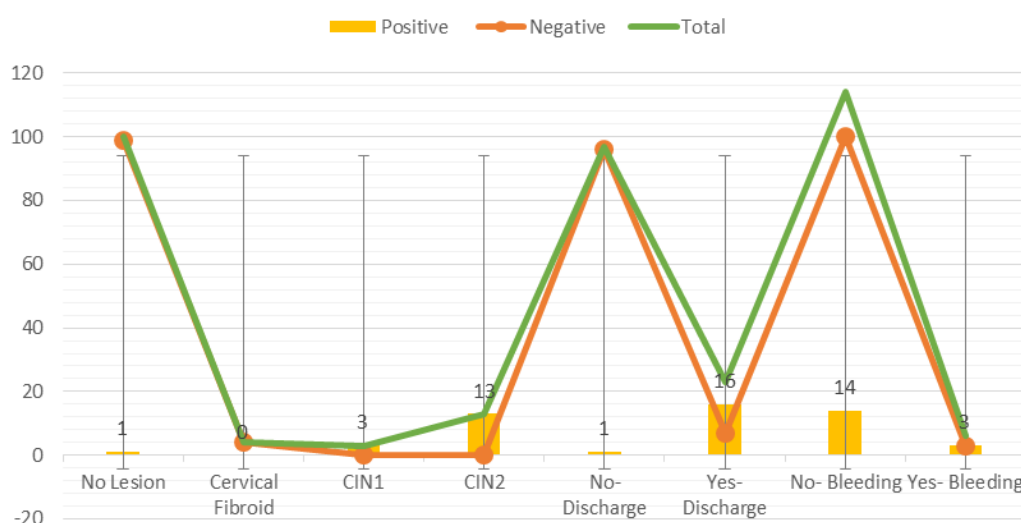
Table 3. Distribution of the study subjects by neoplastic changes and clinical findings.

Variable	Absent	Present	Total
Cervical Lesions			
No Lesion	99	1	100
Cervical Fibroid	4	0	4
CIN1	0	3	3
CIN2	0	13	13
Total	103	17	120
Discharge			
No	96	1	97
Yes	7	16	23
Total	103	17	120
Bleeding			
No	100	14	114
Yes	3	3	6
Total	103	17	120

Vaginal discharge was seen in 16/17 (94%) positive patients and 7/103 (6.8%) negative cases. Women who tested positive for VIA had a higher risk of vaginal discharge (RR = 13.8487, 95% CI = 6.7073 to 28.5940), P < 0.0001. Both groups experienced bleeding at equal rates.

Figure 3. Study subjects by neoplastic changes and clinical findings.

4. Discussion

Cervical cancer is one of the most preventable malignancies, provided that adequate prevention and early detection initiatives are adopted. However, in Sudan, due to insufficient health-care facilities due to economic constraints, as well as the ongoing destructive conflict, there has been an increase in the number of cancers, including cervical cancer. As a result, most health interventions make use of the most basic facilities available. As a result, in the present investigation, we used the VIA-test to screen for predicted neoplastic alterations in this community.

The current study's findings demonstrate a considerably higher incidence rate of cervical neoplastic alterations, indicating the need for immediate interventions using more targeted ways to prevent many cases from progressing to cervical cancer. In a similar setting, a Sudanese study used colposcopy and biopsy as gold standards and discovered that the VIA-test was more sensitive than the Pap test. Using gold standards, the overall prevalence of cervical intraepithelial was 9.4% in the tested group. When used alone, the VIA-test has reduced specificity and sensitivity (detecting only 7.6%) [7]. Such indicators suggest that our current findings may have missed some cases, in addition to the fact that Ibrahim et al.'s study was published in 2012, when Sudan had better health care facilities, which have since deteriorated. To the best of our knowledge, no similar occurrence has occurred since 2012.

A similar finding to our current study results was previously published from Sudan's neighboring nation (Ethiopia), where they discovered positive VIA tests in 18.5% of their examined candidates [8]. In Africa, the epidemiology of cervical screening outcomes varies substantially depending on the epidemiology of some synergistic factors, most notably the epidemiology of HPV and Human immunodeficiency virus (HIV) in that nation [9]. Almost all nations that have adopted viable cervical screening programs have seen a significant drop in the incidence of cervical cancer [2]. These circumstances need the prompt implementation of effective and sustained screening programs in Sudan.

In the current study, rural respondents outperformed urban respondents. This could apply to social difficulties as well as financial status, which is low in rural areas, therefore they seek out any free services. Furthermore, the current study's findings indicate a significant cervical neoplastic shift in urban women compared to rural women, despite the fact that rural participants outnumber urban participants. Globally, cervical cancer incidence is higher in rural areas than in urban areas, which could be explained by a variety of variables, including disparities in access to cervical cancer preventative methods [10]. Previous research has found that women in rural areas are less likely to receive cervical cancer screening than those in cities. Differences in cervical cancer screening between rural and urban areas were primarily explained by several community health center and catchment area variables [11]. The majority of studies in this regard demonstrate that cervical cancer is more common among rural populations than in urban areas. The current study's disparities could be attributed to the level of HPV dissemination, which may be higher among urban populations than among socially conservative rural populations [12]. Furthermore, we observed an increase in positive instances among individuals with primary education, despite

the fact that the majority of participants were illiterate.

Although the current study provided valuable updates on cervical cancer early detection in Sudan, it has some limitations, including a cross-sectional design and the absence of confirmatory measures.

5. Conclusion

In Conclusion: cervical neoplastic alterations are common in northern Kordofan, but there are few screening programs available. Cervical neoplastic alterations are substantially higher in the metropolitan population. Sudan urgently needs to adopt cervical cancer prevention and early detection programs.

Abbreviations

HPV	Human Papilloma Virus
VIA	Visual Inspection Acetic Acid
SPSS	Statistical Package for Social Sciences
MRCC	Prof Medical Research Consultancy Center

Acknowledgments

Funding

Author Contributions

Mahadi Musa Mohammed Abdallah: Conceptualization, Data collection, Formal Analysis, Funding acquisition, Investigation, Methodology, Validation

Nawal Ali Ahmed Mohamed: Conceptualization, Investigation, Supervision, Validation, Writing – review & editing

Inaam Eloshary Mohammed Hayaty: Data collection, Formal Analysis, Methodology, Resources, Writing – original draft

Ahmed Abdelkerim Ahmed Abdallah: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Methodology, Resources, Writing – original draft

Salah Eldinn Eltahir Gumaa: Conceptualization, Funding acquisition, Investigation, Resources, Validation, Visualization, Writing – original draft

Rogeia Mahmoud Niyle: Conceptualization, Funding acquisition, Methodology, Resources, Visualization, Writing – original draft

Sahar ALshareef Hasbsedo: Conceptualization, Data curation, Funding acquisition, Resources, Validation, Visualization, Writing – original draft

Hassan Yousif Adam Regal: Conceptualization, Formal Analysis, Funding acquisition, Investigation, Project administration, Validation

Khalil Ali Ibraheim: Conceptualization, Funding acquisition, Investigation, Project administration, Validation, Writing – original draft

Ekhlas Alrasheid Abuelfadol: Conceptualization, Funding acquisition, Investigation, Project administration, Validation, Resources, Visualization Writing – original draft

Hussain Gadelkarim Ahmed: Formal Analysis, Project administration, Supervision, Validation, Writing – review & editing

Data Availability Statement

Data regarding this research can be requested from the corresponding authors.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Jha AK, Mithun S, Sherkhane UB, Jaiswar V, Osong B, Purandare N, Kannan S, Prabhash K, Gupta S, Vanneste B, Rangarajan V, Dekker A, Wee L. Systematic review and meta-analysis of prediction models used in cervical cancer. Artif Intell Med. 2023; 139: 102549. https://doi.org/10.1016/j.artmed.2023.102549

[2] Mansour T, Limaiem F. Cervical Screening. 2023 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan. PMID: 30726033.

[3] Kusakabe M, Taguchi A, Sone K, Mori M, Osuga Y. Carcinogenesis and management of human papillomavirus-associated cervical cancer. Int J Clin Oncol. 2023; 28(8): 965-974. https://doi.org/10.1007/s10147-023-02337-7

[4] Williamson AL. Recent Developments in Human Papillomavirus (HPV) Vaccinology. Viruses 2023; 15(7): 1440. https://doi.org/10.3390/v15071440

[5] Mohamed KEH, and Ashmeig AAA. Cervical cancer: Our experience in Sudan. In: Proceedings of the American Association for Cancer Research Annual Meeting 2017; 2017 Apr 1-5; Washington, DC. Philadelphia (PA): AACR; Cancer Res 2017; 77(13 Suppl): Abstract nr 771. https://doi.org/10.1158/1538-7445.AM2017-771

[6] Kassa R, Irene Y, Woldetsadik E, Kidane E, Higgins M, Dejene T, Wells J. Survival of women with cervical cancer in East Africa: a systematic review and meta-analysis. J Obstet Gynaecol. 2023; 43(2): 2253308. https://doi.org/10.1080/01443615.2023.2253308

[7]   Ibrahim A, Aro AR, Rask, Pukkala E. Cervical cancer screening in primary health care setting in Sudan: a comparative study of visual inspection with acetic acid and Pap smear. Int J Womens Health 2012; 4: 67-73. https://doi.org/10.2147/IJWH.S28406

[8]   Wakwoya EB, Sadi CG, Sendo EG. Precancerous cervical lesion screening acceptance among women in Eastern Ethiopia. BMJ Open 2023; 13(11): e073721. https://doi.org/10.1136/bmjopen-2023-073721

[9]   Lawson O, Ameyan L, Tukur Z, Dunu S, Kerry M, Okuyemi OO, Yusuf Z, Fasawe O, Wiwa O, Hebert KS, Joseph JT, Nwokwu UE, Okpako O, Chime CI. Cervical cancer screening outcomes in public health facilities in three states in Nigeria. BMC Public Health 2023; 23(1): 1688. https://doi.org/10.1186/s12889-023-16539-1

[10] Zhetpisbayeva I, Kassymbekova F, Sarmuldayeva S, Semenova Y, Glushkova N. Cervical Cancer Prevention in Rural Areas. Ann Glob Health 2023; 89(1): 75. https://doi.org/10.5334/aogh.4133

[11] Lee H, Baeker Bispo J, Pal Choudhury P, Wiese D, Jemal A, Islami F. Factors contributing to differences in cervical cancer screening in rural and urban community health centers. Cancer 2024 Mar 25. https://doi.org/10.1002/cncr.35265

[12] Zahnd WE, Rodriguez C, Jenkins WD. Rural-Urban Differences in Human Papillomavirus-associated Cancer Trends and Rates. J Rural Health 2019; 35(2): 208-215. https://doi.org/10.1111/jrh.12305