*FUDMA Journal of Sciences (FJS)*
*ISSN online: 2616-1370*
*ISSN print: 2645 - 2944*
*Vol. 9 No. 10, October, 2025, pp 290 – 295*
*DOI: https://doi.org/10.33003/fjs-2025-0910-3857*

# COMPARATIVE STUDIES OF HEPATITIS C PREVALENCE AMONG PATIENTS ATTENDING SELECTED PUBLIC HEALTH FACILITIES IN KARU L.G.A. NASARAWA STATE, NIGERIA

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## ABSTRACT

Hepatitis C Virus (HCV) infection is responsible for a large proportion of hepatitis morbidity and mortality in Nigeria as more than 90% of infected persons are unaware of their conditions and as such do not bother to seek treatment. This study aimed to assess how demographic variables and behavioural practices influence the distribution of HCV infections among patients attending Uke General Hospital and the Primary Health Centre (PHC) in Karu Local Government Area of Nasarawa State, Nigeria. A total of 360 patients were examined, 180 from each healthcare facility, with their blood samples collected and screened using Serological Test and Molecular Assay procedure. A designed questionnaire was administered to each consenting participant during the period of the study for socio demographic data. The data generated were analysed using STATA Version 17.0 at P< 0.05 level of significance. Uke General Hospital recorded slightly more HCV prevalence (13.3%) than PHC Karu (10.0%). Higher HCV prevalence was reported among patients aged 30–39 in both health facilities with males showing a significantly greater level of infection compared to females. Additionally, individuals with little or no formal education recorded more infections. Behavioural factors such as tattooing, scarification, having multiple sexual partners, and history of blood transfusion were identified as significant risk contributors. High prevalence of HCV in Karu LGA remains a significant public health concern, particularly among young adults, men, and patients with low educational attainment. Addressing this issue requires a multi-dimensional approach focused on education, behavioural change, access to healthcare, and policy regulation.

**Keywords**: Hepatitis C Virus, Prevalence, Infections, Demographic Variables, Transmission

## INTRODUCTION

Morbidity and mortality due to hepatitis C virus (HCV) infection continue to increase globally. Every day, 3,500 people die globally due to Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections, particularly in low-and middle-income countries (WHO, 2024). The epidemic and endemic genotypes have been proposed and this may be due to current classification (Peer *et al*., 2024). There is higher variability of endemic HCV subtypes which are mainly distributed in Africa and Asia (Shah *et al*., 2021). Hepatitis C can often lead to chronic hepatic diseases such as liver cirrhosis, hepatocellular cancer, hepatitis related deaths, psychological and occupational diseases (Liu and Chen, 2022). The infection is responsible for a large proportion of hepatitis morbidity and mortality in Nigeria as more than 90% of infected persons are unaware of their conditions and as such do not bother to seek treatment (Oluwaseyi *et al*., 2023). According to Nasarawa State's Viral hepatitis elimination program, the state has a higher prevalence than the national average with an estimated 13.2% prevalence (Chikwendu *et al.*, 2023). During the last few years, new and more tolerable drugs have been developed with cure rates of >95%, this is one of the greatest medical advances in decades (Manns and Maasoumy, 2022). The World Health Organization (WHO) has set an ambitious goal, "Viral hepatitis Strategy", to eliminate HCV as a major public health threat by 2030 (Viral Hepatitis Elimination, 2024). Between 2015 and 2030, the WHO targets include reducing new HCV infections by 90%, the number of deaths caused by HCV by 65%, and increasing the number of eligible persons receiving HCV treatment to 80% (WHO, 2018). Monitoring Hepatitis C development in Nigeria is difficult due to inadequate health intelligence and surveillance systems to monitor and control the incidences and prevalence of disease (WHO, 2024). Other challenges include; lack of central National database on the virus (Yusuf and Akande,2021), manual system of health records collection, storage and access by majority of health care providers and lack of synchronized records of existing and newly diagnosed patients (Jeremiah *et al*., 2024; Idakwo, 2019). Since most of the infections with HCV are asymptomatic, screening is a tool to identify individuals at risk of liver disease and who might benefit from treatment. According to WHO (2024) in order to reach the targets of 2030, the following measures would have to be put in place; carrying out different types of screening tests, safe blood transfusions, safe injections through harm reduction with needle exchange programs, increased number of needles per people who inject drugs (PWID), and treatment to be eligible for all individuals with chronic hepatitis C (CHC).

## MATERIALS AND METHODS

### Study Area

This study was carried out in Karu Local Government Area in Nasarawa State, Nigeria, using Uke General Hospital and Primary Health Centre, Karu as case studies and collection centres, representing Nasarawa west. The state is located in *Latitude: 8° 32' 20.22" N Longitude: 7° 42' 29.56" E*. with close proximity to the Federal Capital Territory of Nigeria. It has an area of 2,640 km$^2$. Karu local government has its headquarters in New Karu town. It was originally built to house the capital's civil servants and lower income families, but had no running water or good sanitation system. The average temperature in Karu LGA is 29 $^0$C and 1250 mm as annual average rainfall. According to the 2006 census, the population of mainly New Karu town was 205,477 although Karu has grown in population beyond its original planned capacity. Ensuring Administrative convenience and bringing government closer to the grass root people, Karshi Development Area was created with its administrative secretariat at Uke (Medicins sans Frontieres, 2021). Figure 1

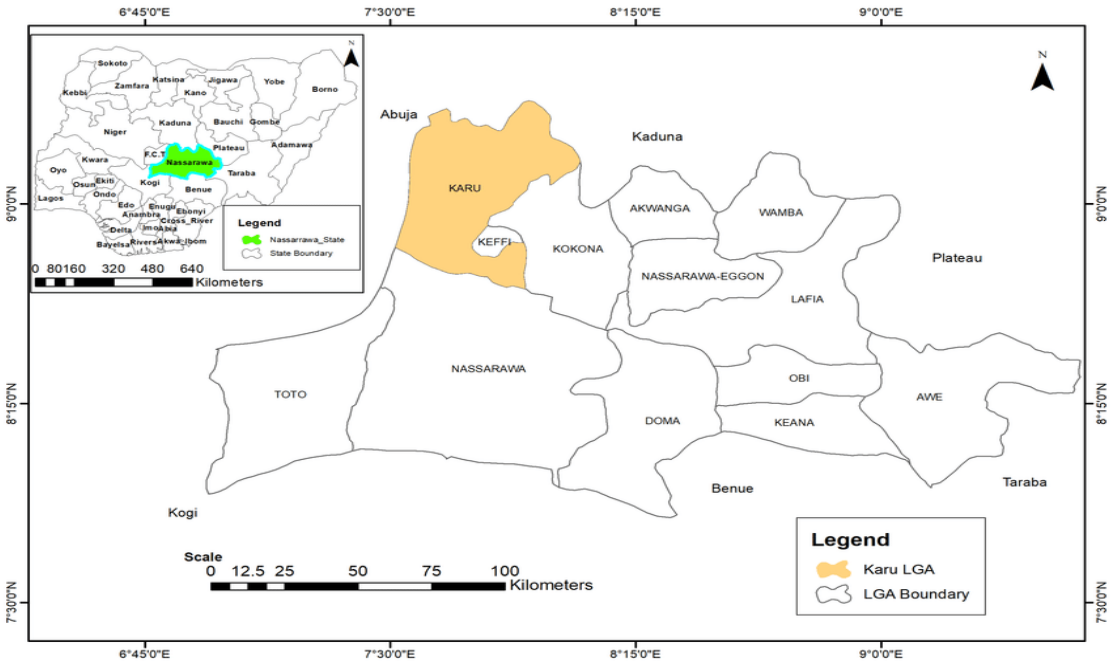


Figure 1: Location Map of Study Area (Medicins sans Fontieres, 2021)

**Study Design**

The study was a descriptive cross-sectional study. Blood samples were collected from male and female patients who willingly gave their consent for the participation in the study attending Uke General Hospital and Primary Health Centre, Karu L.G.A. Nasarawa State. Well-structured questionnaires were administered to the patients at the consulting or collection room where blood samples were collected.

**Sample Size Determination**

A minimum sample size was calculated to be 282 considering 24.2% prevalence (the last reported) in Auta Balefi, a community within Karu Local Government Area (Pennap *et al*., 2016)

Utilizing the formula (Jaykaran and Tamoghna, 2013)

$$n = \frac{Z^2 P\,(1-p)}{e^2} \qquad (1)$$

Where:

N = Sample size

Z = Standard normal distribution of 95% confidence interval = 1.96.

P = Known prevalence of the infection.

D = Margin error which is taken at 5% = 0.05

The sample size was increased to 400 to enhance precision to error margin and for potential non-response, out of which 360 complete results (180 each, from both study locations) were obtained from the participants.

**Ethical Clearance Approval**

Ethical clearance was obtained from Ministry of Health, Nasarawa State, Nigeria with Health Research Ethics Committee Reg. No: NHREC/18/06/2017.

**Sample Collection and Processing**

Ten millilitres of blood samples were collected, from each patient by venipuncture and transferred into the labelled plain sterile container or vacationer tube (WHO, 2010). The collected blood samples were then allowed to clot at room temperature and the Scar was separated by centrifugation at 3000rpm for 10minute and kept at $20^0$C until needed for analysis (Junaid *et al.,* 2014). A designed questionnaire was administered to each consenting participant during the period of the study for socio demographic data.

**Serological Test and Molecular Assay**

Detection of antibodies to HCV: Antibodies to HCV (anti-HCV Ig) were detected using rapid Immunochromatographic (ICT) diagnostic test kit (DTK Biotech, USA). This test is a lateral flow ICT for the qualitative detection of antibodies to HCV in the human blood. This detection card applies the principle of indirect, gold Immunochromatographic (GICA) method. The detection zone of nitrocellulose membrane is coated with mouse anti-human monoclonal antibody, and the glass fibre paper is pre-coated with gold-labelled natural HCV antigen. The reagent and sample were adjusted to room temperature ($28\pm2^0$C) before use according to manufacturer instruction. The detection card was removed and placed on flat and clean table, 5µl of sample was added to the sample well and 2-3 drops (100-150µl) of sample diluents were added, the result was observed within 15-20 minutes. The samples were carried out upward chromatography by capillary effect after being added into the sample well of the detection card. If there is a certain concentration of HCV antibody in sample the antibody will combine with the gold-labelled natural HCV antigen on the detection line (T-line). Gold-labelled antigen, antibody complex will accumulate in the detection area and indicates a red line. Any shade of red line in the detection area (T-line) as well as control area (Cline) was taken as positive. If little or no HCV antibody exists, red line will not appear in the detection area (T-line) but only in the control area (C-line) and it was taken as negative. The quality control area (C-line) on the detection card is the standard reference to determine whether the chromatography is normal and the detection system is effective. The red line is expected to appear on the C-line under all conditions, otherwise the result is considered invalid and re-test will be required. The result is invalid after 30 minutes of the test (Mbah *et al*., 2024)

**Statistical Analysis of Data**

Data generated from this study were analysed using STATA Version 17.0. The values were expressed in percentages and frequencies. Level of significance used was P< 0-05.

## RESULTS AND DISCUSSION

A detailed interpretation of the data collected on the prevalence of Hepatitis C Virus (HCV) among patients attending Uke General Hospital and the Primary Health Centre (PHC) in Karu Local Government Area of Nasarawa State, Nigeria is presented in this section. The study aimed to assess how factors such as age, gender, education level, and behavioural practices influence the distribution of HCV infections in the study population. Well-structured questionnaires were administered to each consenting participant during the period of study for the socio-demographic data and potential risk factors outlined above. A total of 360 patients were examined, 180 from each healthcare facility.

### Age and Gender Distribution of Examined Patients Attending Uke General Hospital

The distribution of HCV infection at Uke General Hospital by age and gender is presented in Table 1. The findings revealed that the age group with the highest prevalence was 30–39 years, accounting for 62.5% of all positive cases. This age category also represents the largest portion of the sample population examined (41.7%). Within this age group, the male gender contributed more significantly to the infection (3 out of 5 cases estimating 60%) compared to females (2 out of 5 with 40% estimation). Notably, the 20–29 and 1–20 age groups were also infected, although to a lesser degree, representing 2 and 1 positive cases respectively. No infections were recorded among individuals aged above 40.

### Educational Status and Hepatitis C Prevalence of Examined Patients Attending Uke General Hospital

At Uke General Hospital, individuals who were uneducated constituted only 15% of the sample population but accounted for 50% of all positive cases, while semi-educated individuals made up 25% of the sample and 37.5% of the infections. Educated individuals, comprising 41.7% of the sampled population, accounted for only 12.5% of infections (Table 1). This distribution underscores the potential protective role of education, likely through enhanced awareness of transmission routes, hygiene, and risk reduction practices.

**Table 1: Prevalence of HCV Infection with Respect to Demographic Data at Uke General Hospital**

| Age groups (years) | No. of Samples examined (%) | HCV | | P-value |
|---|---|---|---|---|
| | | No. positive samples (%) | No. Negative samples (%) | |
| 1–20 | 45 (25.0) | 3 (12.5) | 42 (26.9) | 0.016* |
| 20–29 | 30 (16.7) | 6 (25.0) | 24 (15.4) | |
| 30–39 | 75 (41.7) | 15 (62.5) | 60 (38.5 | |
| Above 40 | 30 (16.7) | 0 (0.0) | 40 (19.23) | |
| **Gender** | | | | |
| Male | 108 (60.0) | 15 (62.5) | 93 (59.6) | 0.788 |
| Female | 72 (40.0) | 9 (37.5)) | 63 (40.4) | |
| **Educational status** | | | | |
| Educated | 75 (41.7) | 3 (12.5) | 72 (46.2) | 0.000* |
| Semi educated | 45 (25.0) | 9 (37.5) | 36 (23.1) | |
| Uneducated | 27 (15.0) | 12 (50.0) | 15 (9.6) | |
| No response | 33 (18.3) | 0 (0.0) | 33 (21.2) | |

* = Statistically significant at p<0.05

### Behavioural Risk Factors and Hepatitis C Virus Infection of Examined Patients Attending Uke General Hospital

Behavioural risk factors as presented in Table 2 further clarified transmission patterns. At Uke General Hospital, patients with tattoos or traditional scarification represented only 8.3% of the examined group but accounted for 50% of infections, pointing to a potentially high-risk transmission route. Those with a history of multiple sexual partners and those who had received blood transfusions also showed significant infection rates, contributing 33.3% and 16.7% of infections respectively. The large proportion of patients (45%) who provided no information on behavioural risk factors yet recorded no infections indicates either a lower actual risk among that group or a gap in accurate reporting.

**Table 2. Prevalence of HCV in Relation to Behavioural Factors for Acquiring HCV Infection at Uke General Hospital**

| Behavioural factors | No. of Samples examined (%) | HCV | | P-value |
|---|---|---|---|---|
| | | No. positive samples (%) | No. Negative samples (%) | |
| Multiple sex partners | 30(16.7) | 6 (33.3) | 24 (14.8) | 0.000* |
| Blood transfusion | 54 (30.0) | 3 (16.7) | 51 (31.5) | |
| Tattoos/Scarification | 15 (8.3) | 9 (50.0) | 6 (3.7) | |
| No response | 81 (45.0) | 0 (0.0) | 81 (50.0) | |
| No response | 33 (18.3) | (0.0) | 33(21.2) | |

* = Statistically significant at p<0.05

### Age and Gender Distribution of Examined Patients Attending PHC Karu

At PHC Karu, the 30–39 age group again constituted the largest segment of the population sampled (50%) with the highest infection rate (50% of all positives) as shown in Table 3. The 1–20 age group recorded a higher proportion of infections (33.3%) highlighting a concerning early exposure to HCV among adolescents and young adults in Karu community. The male gender reported infection rates than females, constituting 4 out of the 6 total positive cases.

### Educational Status and Hepatitis C Prevalence of Examined Patients Attending PHC Karu

At PHC Karu, a similar trend with uneducated individuals (15% of the population) made up 50% of positive cases. While educated and semi-educated individuals also recorded infections, the level was considerably lower (Table 3).

**Table 3: Prevalence of HCV Infection with Respect to Demographic Data at PHC Karu**

| Age groups (years) | No. of Samples examined (%) | HCV | | P-value |
|---|---|---|---|---|
| | | No. positive samples (%) | No. Negative samples (%) | |
| 1–20 | 30 (16.7) | 6 (33.3) | 24 (14.8) | 0.019* |
| 20–29 | 15 (8.3) | 3 (16.7) | 12 (7.4) | |
| 30–39 | 90 (50.0) | 9 (50.0) | 81 (50.0) | |
| Above 40 | 45 (25.0) | 0 (0.0) | 45 (27.78) | |
| **Gender** | | | | |
| Male | 117 (60.0) | 12 (66.7) | 105 (64.8) | 0.876 |
| Female | 63 (40.0) | 6 (33.3)) | 57 (35.2) | |
| **Educational status** | | | | |
| Educated | 60 (33.3) | 6 (33.3) | 54 (33.3) | 0.000* |
| Semi educated | 45 (25.0) | 3 (16.7) | 42 (25.9) | |
| Uneducated | 27 (15.0) | 9 (50.0) | 18 (11.1) | |
| No response | 48 (26.7) | 0 (0.0) | 48 (29.6) | |
| No response | 33 (18.3) | 0 (0.0) | 33 (21.2) | |

* = Statistically significant at p<0.05

**Behavioural Risk Factors and Hepatitis C Infection of Examined Patients Attending PHC Karu**

Comparatively, at PHC Karu, tattoos and scarification also presented the highest associated infection rate (37.5%), patients with a history of multiple sexual partners and blood transfusions constituted 25% each. It is noteworthy that even individuals who did not report any behavioural risk still accounted for 12.5%, indicating that other, perhaps unrecorded or unrecognized, risk factors may be in play (Table 4).

**Table 4: Prevalence of HCV in Relation to Behavioural Factors for Acquiring HCV Infection at PHC Karu**

| Behavioural factors | No. of Samples examined (%) | HCV | | P-value |
|---|---|---|---|---|
| | | No. positive samples (%) | No. Negative samples (%) | |
| Multiple sex partners | 30 (16.7) | 6 (25.0) | 24 (15.4) | 0.000* |
| Blood transfusion | 45 (25.0) | 6 (25.0) | 39 (25.0) | |
| Tattoos/Scarification | 90 (50.0) | 9 (37.5) | 81 (51.9) | |
| No response | 15 (8.3) | 3 (12.5) | 12 (7.7) | |
| No response | 33 (18.3) | 0 (0.0) | 33 (21.2) | |

* = Statistically significant at p<0.05

**Comparison of Results Based on Age and Gender Distribution from both Study Locations**

The findings indicate that the age group 30–39 years had the highest prevalence of HCV infection across both healthcare facilities. At Uke General Hospital, this age group accounted for 62.5% of all positive cases, while at PHC Karu, they represented 50% of the total positive cases. This corresponds to the findings of Iduh *et al*. (2024) who reported highest seropositivity prevalence of 18.18% in 36-40 age group among people living with HIV/AIDS attending Specialist hospital in Sokoto, Nigeria. Highest seroprevalence (5.6%) among similar age group was reported among patients living with HIV virus attending Aminu Kano Teaching hospital Kano, Nigeria (Hassan *et a*l., 2021). This suggests that patients in this age bracket, often considered to be in their most economically and socially active years, were more exposed to risk factors associated with Hepatitis C transmission. Their high level of mobility, engagement in sexual activities, and possible contact with unsafe medical or traditional practices may explain this vulnerability. Gender distribution also showed that males were more affected than females contrary to the report of Mbah *et al.,* 2024. At Uke General Hospital, males accounted for 62.5% of infections, and at PHC Karu, 66.7%. Similar result was reported by Raufu *et al*. (2022) who reported 5% prevalence among male scavengers in Kwara state, Nigeria. Higher male prevalence could be due to a greater likelihood of males engaging in risk-associated behaviours such as body tattoos, unsafe sexual practices, and occupational exposure to unsanitary tools or environments. Additionally, societal norms in many communities often discourage women from disclosing sensitive information about their lifestyles, possibly leading to underreporting among females, in contrast to Iduh *et al*. (2024).

**Comparison of Results Based on Educational Status Distribution from Both Study Locations**

Influence of educational status indicated a clear inverse relationship between educational attainment and HCV infection risk. At both health facilities, uneducated individuals comprised only 15% of the sample population. Educated individuals, by contrast, were less likely to be infected. At Uke, they made up 41.7% of the population but contributed only 12.5% of positive cases. At PHC Karu, they constituted 33.3% of participants and also represented only 33.3% of infections. This finding is in line with Olabowale and Adebayo (2018) who reported a low prevalence of 0.7% among university students in Nigeria. Garbati *et al*. (2024) and Kingsley *et al*. (2023) both observed that low literacy levels contributed significantly to the persistence of HCV infections, particularly in under-served communities where health education is lacking.

This clearly suggests that individuals with higher levels of education were more likely to possess knowledge about disease prevention, the dangers of sharing sharp objects, the importance of safe sexual practices, and proper health-seeking behaviour. Educational status also showed a strong correlation with HCV prevalence in this study. This result reinforces the importance of health education and awareness programs, especially among populations with limited or no

formal education. Increasing access to health information could significantly reduce HCV transmission in vulnerable communities.

**Comparison of Results Based on Behavioural Risk Factor Distribution from both Study Locations**

With respect to behavioural risk factors, the present study identified tattooing, scarification, multiple sexual partners, and history of blood transfusions as major contributors to HCV transmission. At Uke General Hospital, patients who had undergone tattooing or traditional scarification made up just 8.3% of participants but accounted for 50% of the positive HCV cases. This indicates that such practices, often performed without sterile equipment, represent a major risk factor for HCV transmission. Other behaviours such as having multiple sexual partners and receiving blood transfusions also contributed significantly to the infection burden. Those who reported multiple sex partners accounted for 33.3% of infections, while those with a history of blood transfusion contributed 16.7%. At PHC Karu, similar patterns were observed. Tattooing or scarification was reported by 50% of participants and was associated with 37.5% of infections. Individuals who had multiple sexual partners and those with blood transfusion histories each accounted for 25% of infections. It is important to note that even among respondents who reported no behavioural risk factors, infections were still recorded. This may indicate the presence of unrecognized or unreported routes of transmission (Woyesa and Amente, 2023; Goldshear *et al*., 2021) or gaps in the participants' understanding of what constitutes a risk. These findings resonate with earlier reports of Hassan *et al*. (2021) who emphasized blood transfusions and traditional scarification as critical risks, especially in rural settings where medical practices may be unregulated. Also, Qdukoya *et al.*, 2022; Olabowale and Adebayo (2018) reported tattoos and multiple sexual partners to be key drivers in Lagos, a more urban setting where body art is increasingly popular. Kingsley *et al*. (2023) further affirmed that traditional skin-penetrating practices and sexual promiscuity were major risk factors among males in Enugu. Collectively, these studies underscore the need for improved regulation of traditional and cosmetic procedures and enhanced public awareness of behavioural risk exposures.

**Comparison of Results Based on Type of Facility from both Study Locations**

In terms of infection prevalence by facility type, the current study recorded more positive cases at Uke General Hospital (13.3%) compared to PHC Karu (10.0%). This is in line with findings from previous studies of Hassan *et al*. (2021) who reported that general hospitals recorded more cases of infections than rural clinics. Olabowale and Adebayo (2018) also reported higher infection cases in Lagos urban hospitals with Kingsley *et al*. (2023) observing similar patterns in tertiary institutions with higher patient volumes and broader outreach.

## CONCLUSION

This study set out to assess the prevalence of Hepatitis C Virus (HCV) infection among patients attending Uke General Hospital and the Primary Health Centre (PHC) in Karu Local Government Area of Nasarawa State, Nigeria. A total of 360 patients were examined, with findings analysed based on demographic characteristics, educational background, and behavioural risk factors. The overall prevalence reported for both health facilities is 11.7%. The results revealed a consistent pattern of higher HCV prevalence among patients aged 30–39 years, with males showing a significantly greater level of infection compared to females. Patients with little or no formal education were more likely to be infected, suggesting a strong link between low health literacy and vulnerability to HCV transmission. Behavioural factors such as tattooing, scarification, having multiple sexual partners, and history of blood transfusion were identified as significant risk contributors. Comparisons with related studies conducted between 2020 and 2025 further confirmed the persistence of these patterns across various regions in Nigeria. The consistency in findings highlights the enduring nature of the risk factors associated with HCV and the urgent need for comprehensive health interventions. The major challenge encountered was obtaining the approval and consent of willing participants due to barriers like privacy concerns. High prevalence of HCV in Karu LGA remains a significant public health concern, particularly among young adults, men, and individuals with low educational attainment. Addressing this issue requires a multi-dimensional approach focused on education, behavioural change, access to healthcare, and policy regulation.

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