**Prevalence of HBsAg in pregnant women consulted and followed at Mangol Health Center in the Urban Commune of Télimélé (Republic of Guinea).**

**ABSTRACT**

Hepatitis B is a viral infection that attacks the liver; its virus persists in the environment for more than 7 days. It is present in all biological fluids of infected subjects, mainly blood. Its main modes of transmission are: sexual, parenteral, maternal-fetal and horizontal transmission. It constitutes a public health problem. This is a prospective and descriptive study of an analytical type. It took place from April 1 toJune 29, 2024. **Objective:** determine the prevalence of HBsAg within the population of pregnant women consulted and followed at the Mangol Health Center, is the main objective of this study. **Method:** the Aichek -type chromatographic immune test technique for the detection of hepatitis B virus (HBV) surface antigen in serum is used. **Results:** out of a total of 234 pregnant women tested for hepatitis B, 5 were HBV carriers, or 2.14%, compared to 229 negative cases, or 97.86%. The 25-33 age group had 3 HBV positive cases, or 60%. Married women, who were not only the most represented in this study, were also the most affected by HBV with 4 cases, or 80%. Housewives and hairdressers were the most affected by HBV with 2 cases respectively, or a respective prevalence of 20%.

**Keywords:** Virus ofHepatitis B, Pregnant women and Telimélé.

1. **INTRODUCTION**

Viral hepatitis B is a liver disease whose causative agent can resist up to 7 days in the external environment. It constitutes an international public health problem due to its frequency, its complications and its socio-economic consequences, comparable to that posed by other major communicable diseases such as HIV, Tuberculosis or Malaria. Sub-Saharan Africa, with a prevalence rate of between 8 and 18%, constitutes an area of high endemicity [1]. The majority of chronic hepatitis B virus infections are contracted at birth through so-called “vertical” transmission. This involves the transmission of the hepatitis B virus from mother to child during delivery, secondary to mother-child micro-transfusions during contractions and contact with infected vaginal secretions. The risk is very high because infected children become chronic carriers of the B virus in 90% of cases. It has therefore been recommended since 1992 in France to systematically screen for the presence of HBs antigen ( HBs Ag ) in all pregnant women during the sixth month [2].

*Hepatitis B virus (HBV) infection remains a global public health problem. In Africa, its prevalence is not uniform in different countries due to a difference in social, economic and cultural disparities [ 3]. In Mauritania, this prevalence seems to be exceptionally high, i.e. 16.2%, it is a major public health problem. [ 4]. Mother-to-child transmission has been identified as one of the causes of the high prevalence of HBV infection [5].*

The World Health Organization (WHO) estimates that more than 2 billion people have been infected with hepatitis B in their lifetime, or about 30% of the world's population. Hepatitis B virus (HBV) is 50 to 100 times more infectious than HIV. Of the global patient population, 360 million (5%) suffer from chronic infections, primarily in Asia and Africa. More than a million of them die each year from complications related to this infection, including liver cirrhosis and hepatocellular carcinoma. HBV is the second most common known human carcinogen after tobacco [6]. *HBV is the second most common carcinogen after tobacco. Vaccination is routinely recommended for newborns because approximately 4.5 million women with this condition give birth each year, with the greatest number in Africa and the Western Pacific regions [* [*7*](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8933451/#ref5) *]. An estimated 16% reduction in this burden would be achieved if one dose of hepatitis B vaccine were routinely administered to prevent perinatal transmission [* [*8*](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8933451/#ref6) *].* In utero transmission appears to be rare, accounting for 2 to 5% of perinatal infections. This vertical transmission is common in asymptomatic carrier women who are unaware of their carrier status. In the event of high viral multiplication in the mother and in the absence of serovaccination, 90% of infected newborns are likely to develop chronic hepatitis B [ 9 ] . Transmission of HBV from mother to child is responsible for more than a third of chronic viral hepatitis [ 10 *]. The current prevalence of HBV in Tunisia is 1.7% (according to Tunisian study carried out in 2016) [ 11 ].*

*In the Democratic Republic of Congo, a low seroprevalence was observed in 2018, i.e. 6.69%. [12]. High prevalences have been observed in similar studies, 12% in Senegal (Dakar) in 2017 [3], 14.02% in Benin in 2019 [14].*

In 2019, the Organization Worldwide of there Health (WHO) estimated that more of 91 million of Africans are living with hepatitis B and 1.2 million new HBV infections have been recorded in the African region, as well as 125,000 deaths linked to this disease. Deaths which occur mainly among population groups comprising people young people And productive (WHO, 2023) [15].

*In daily hospital practice, accessibility to immunological and especially virological markers remains a major problem and only HBsAg is often routinely sought for screening, diagnosis and monitoring of HBV infection [16].*

In the Republic of Guinea, as in other countries, the majority of the population does not have sufficient information on the existence and circulation of HBV within it, and yet the development and spread of this virus constitutes a real public health problem that affects all age groups, all sexes and all socio-professional groups.

**II. Materials and Methods**

**II.1 Environment and setting of the study: this study was carried out at the** Mangol Health Center in the Urban Commune of Télimélé. The laboratory of medical biology​ the Institute Superior of Technology of Mamou has served of study framework for carrying out this present work. The Mamou Higher Institute of Technology is a professional public establishment, attached to the Ministry of Higher Education, Scientific Research and Innovation (MESRSI). It was created by Decree No. 2004/9245/MESRS/CAB of August 25, 2004 as part of the decentralization of higher education establishments (IES) in the Republic of Guinea. Since its creation, it has six (6) Departments including that of Laboratory Techniques.

**II.2** **Working equipment: to carry out this work, we used the following equipment: electric centrifuge,** Aichek chromatographic immune test strip , stopwatch, pasteur pipette, hydrophilic cottons, latex gloves, 5cc syringes, hemolysis tubes, boxes of security and garbage can.

**II.3 Working method:** this is a longitudinal, prospective and descriptive study which took place from April 1 to June 29, 2024. Pregnant women followed at the Mangol Health Center were OUR study population. Were included in this study, all pregnant women received and monitored at the Mangol Health Center and who have accepted to submit to our study. Sampling has summer random simple and the sample size was n = 234 pregnant women, using the Schwartz formula.

**II.4 Biomaterial:** blood collected from pregnant women was used as biomaterial.

**II.5 Parameters studied:** sociodemographic data were: age, number of births, sources of information (radio, television, social networks, newspapers). Knowledge covered the existence of viral hepatitis B, sources of information, the causative agent, routes of contamination, risk factors for infection and means of prevention.

**II.6 Variables subject to study**

* **Variable biological:** HBs Ag and Transaminase
* **Variables sociodemographic:** age,number of births, sources of information, routes of contamination, risky practicesAndsituation marital.

**II.7 Methods of collection and computer analyzes of data**

For data collection, we used pre-established survey sheets and register of the laboratory. The information collected was analyzed manually, entered using Microsoft Word and Excel software under Windows 2016 and the analyzes were carried out using Epi Data software. For the analysis, we used SPSS version 21 software. This analysis firstly consisted of a descriptive analysis (means and frequencies) of sociodemographic parameters and knowledge of viral hepatitis B. Secondly, we studied the relationship between knowledge of the existence of viral hepatitis B and sociodemographic factors in multivariate analysis by logistic regression. This relationship was expressed as an Odds ratio with its 95% confidence interval and as a degree of significance p (5% significance level).

**II.8 Methods of diagnosis biological hepatitis B**

Aichek type chromatographic immune test technique for the detection of the antigen of surface of HBV in the serum. When the first testswere positive, the women concerned were called back for a 2nd test 2 weeks apart and always giving the same result (positive).

**Operating principle of the HBs Ag test : the** HBs Ag rapid test strip (analysis total/serum/plasma) has summer designed For detect HBsAg​​ by the interpretation visual of the evolution of the color on the strip. The membrane was immobilized with antibodies anti- HBsAg on the test region. During the test, the sample reacts with the gold conjugate Colored anti- HBsAg antibody colloid , which has been pre-coated onto the test sample pad. The mixture then moves across the membrane by capillary action and interacts with the reagents present on the membrane. If yes there is enough of HBsAg In the samples, a band​ colorful appears in the region - membrane test. The presence of this colored band indicates a positive result, while its absence indicates a negative result. The appearance of the band colored in the control region serves as a procedural control.

**II.9 Ethical considerations**

Before carrying out the study, we obtained the agreement and consent of each pregnant woman, confidentiality was respected throughout the data collection procedure and the results were used for strictly therapeutic and scientific purposes. Our study conformed to the 1975 Declaration of Helsinki on the Ethical Principles of Medical Research Involving Human Beings, as amended in 2008.

**III. Results**

The application of the research methodology has leads to the following results in the form of tables interpreted, commented and discussed according to the data available from the literature.

**Table I: Sociodemographic characteristics of 234 pregnant women subject to the study**

|  |  |  |
| --- | --- | --- |
| **Settings** | **Effective** | **Percentage** |
| **Age groups** | | |
| 16-24 years old | 32 | 13.67 |
| 25-33 years old | 87 | 37.17 |
| 34-42 years old | 90 | 38.46 |
| 43 years and over | 25 | 10.68 |
|  | **Number of births** |  |
| Primiparous | 61 | 26.07 |
| Multiparous | 173 | 73.93 |
| **Knowledge of the hepatitis B virus** | | |
| Yes | 53 | 22.65 |
| No | 181 | 77.35 |
| **News source** | | |
| Radio | 94 | 40.17 |
| Television | 72 | 30.76 |
| Newspapers | 7 | 2.99 |
| Social networks | 36 | 15.38 |
| Schools | 25 | 10.68 |
| **Transmission routes** | | |
| Sanguine | 71 | 30.34 |
| Sexual | 154 | 65.81 |
| Salivary | 9 | 3.85 |
| **Risky practices** | | |
| Prostitution | 127 | 54.27 |
| Acupuncture | 8 | 3.42 |
| Piercing | 26 | 11.11 |
| Tattoo | 73 | 31.10 |
| **Knowledge of the existence of a vaccine** | | |
| Yes | 43 | 18.37 |
| No | 191 | 81.62 |
| **Total** | **234** | **100** |

It appears from this table that the age group between 34-42 years old was the most represented in this study with a rate of 38.46% followed by that between 25-33 years old with a rate of 37.17%. The age group 43 and over was the least represented in this study with a rate of 10.68%.

In relation to the number of births, first-time women were the least represented with a rate of 26.07% compared to 73.93% for multi-parous women.

Regarding knowledge of the hepatitis B virus, the majority of pregnant women tested declared having no knowledge of the virus, i.e. 77.35% compared to 22.65% of those who declared having knowledge of the virus.

Concerning the sources of information, the majority of pregnant women interviewed indicated the radio as a source of information, i.e. 40.17% of these women, followed by television with 30.76%. Newspapers represented the least informative source of information on the hepatitis B virus for these women tested, i.e. 2.99%.

Concerning the routes of transmission, the vast majority of pregnant women tested indicated the sexual route as being the main route of transmission of the virus, with 65.81%, followed by the blood route with 30.34% and by saliva with 3.85%.

Regarding risky practices, the majority of pregnant women tested cited prostitution as the main risky practice with 54.27%, followed by tattooing with 31.10%, acupuncture was the risky practice the lowest indicated with 3.42%.

Regarding knowledge of the hepatitis B vaccine, the majority of pregnant women tested declared having no knowledge of the vaccine, i.e. 81.62% of these women compared to 18.37% of those who declared knowledge of the vaccine. existence of the vaccine.

**Painting II : Typology results**

|  |  |  |  |
| --- | --- | --- | --- |
| **Exam** | **Results** | **Effective** | **Percentage (%)** |
| Ag HBs | Positive points | 5 | 2.14 |
| Negatives | 229 | 97.86 |
| **Total** | | **234** | **100** |

The results of this table show that of the 234 women tested for the Hepatitis B virus, only 5 women were positive for HBs Ag with a rate of 2.14% compared to 229 women tested negative for this virus, i.e. 97 .86%. No cases of disability was not observed in this study .

This observed prevalence of hepatitis B virus infection among pregnant women followed at the Mangol Health Center could be due to a lack of knowledge of the virus and its modes of transmission. The hepatitis B virus is 50 to 100 times more contaminating than HIV due to the possibility of contamination by all the biological fluids of the contaminated subject and its resistance in the external environment.

**Table III: Pathophysiological variation of transaminases in pregnant women positive for the chromatographic immune test for the detection of HBsAg**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Transaminases** | **Values** | | | | | |
| **Low** | | **Normal** | | **High** | |
| **Effective** | **%** | **Effective** | **%** | **Effective** | **%** |
| **ALAT** | **-** | **-** | 3 | 60 | 2 | 40 |
| **ASAT** | **-** | **-** | 4 | 80 | 1 | 20 |

This table shows that of the 5 pregnant women affected by the hepatitis B virus, there is a variation in the level of transaminases:

* 3 pregnant women had a normal ALT level, i.e. 60% compared to 2 pregnant women who had a high ALT level, i.e. 40%.
* 4 pregnant women had a normal AST level, i.e. 80%. No cases of elevated AST were observed.

These results clearly show that in pregnant women with hepatitis B, there may be variations in transaminases. This could be explained by the fact that infections caused by the hepatitis B virus are capable of causing liver damage characterized by an increase in ALT levels. As for the AST level (non-specific liver enzyme), its elevation could mean an attack on other sensitive organs including the heart, lungs, muscles, kidneys, etc.

**Table IV: Distribution of pregnant women affected by the hepatitis B virus according to socio-professional parameters**

|  |  |  |
| --- | --- | --- |
| **Settings** | **Effective** | **Percentage** |
| **Age groups** | | |
| 25-33 years old | 3 | 60 |
| 43 years and over | 2 | 40 |
| **Civil states** | | |
| Brides | 4 | 80 |
| Bachelor | 1 | 20 |
| **Socio-professional categories** | | |
| Housewives | 2 | 40 |
| Hairdresser​ | 2 | 40 |
| Seamstress | 1 | 20 |
| **Residences** | | |
| Kolly | 3 | 60 |
| Dara | 1 | 20 |
| Barkéré | 1 | 20 |
| **Total** | **3** | **100** |

It appears from this table that among the 5 pregnant women tested positive for the hepatitis B virus, those in the age group of 25-33 were the most affected with a prevalence of 60% followed by those aged 43 and more with a prevalence of 40%.

Married women were not only the most represented in this study, they were also the most affected with a prevalence of 80% compared to 20% for single women positive for the hepatitis B virus with just one case.

Compared to socio-professional categories, housewives and hairdressers were the most affected with 2 cases respectively, i.e. 40% for each of these categories compared to 20% in the case of a single woman seamstress.

In relation to their residences, the results of this table show that 3 of these HBV positive women came from the Kolly district , i.e. 60% and the other 2 women came one from the Dara district and the other from the Barkéré district , i.e. a respective prevalence of 20% . This demonstrates that HBV is circulating in this urban commune of Télimélé.

**IV. Discussion**

Our study demonstrated a prevalence of 2.14% of HBsAg carriage among the 234 pregnant women subjected to the study, i.e. 5 positive women tested. In countries with high hepatitis B endemicity, the most common mode of transmission is mother-to-child transmission. To remedy this, it is recommended to screen pregnant women from the first trimester of pregnancy [17]. Or at any time even if they were vaccinated before becoming pregnant [18]. In our study, the average gestational age at the time of screening was 31 weeks of amenorrhea. And more than half of pregnant women (58.88%) were in the 2nd trimester of their pregnancy. It is therefore up to the midwives and gynecologists of the Mangol Health Center to carry out this screening for all pregnant women from the first trimester of their pregnancy. The HBsAg that we used in our study for screening is a good marker for assessing HBV carriage in a population since its presence indicates either acute viral hepatitis B or a chronic carriage state. In our study, the age of the pregnant woman was not related to HBsAg positivity . This is consistent with epidemiological data revealing the high prevalence of vertical and horizontal perinatal transmission of HBV in our country [19].

Our results are comparable to those of certain authors. Khadidjatou et *al.,* 2019. In a study in Benin, reported that of the 214 pregnant women interviewed, 30 women screened positive for HBsAg , a prevalence of 14.02%, much higher than that of our study which is of 2.14% [17]. The results of our study remain lower than those found by Bigot *et al,* during another prospective study carried out in 1989 in Cotonou where the prevalence was 8.26% [ [20](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6814903/#cit0013) ]. Indeed, according to the study carried out among new blood donors in 2013 throughout the Beninese territory, the prevalence of HBV infection was 20.15% in the north and 9.08% in the departments of the Coast and the Atlantic [ 21 ]. Our results are similar to those obtained in other studies, particularly in Sub-Saharan Africa. Indeed, Candotti *et al* [ [22](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6814903/#cit0015) ].

“The prevalence of HBsAg among pregnant women worldwide is variable [23]. Our results are lower than those reported in Guinea (17.90%) by Makanera et *al* in 2019 , in Mauritania (5%) by Boushab M. B et *al* [24] and in Gambia (9.2%) by Mustapha B et *al* [23]. They are even lower than those reported in Senegal (12%) by Maguette S. N et *al* [6]. The results from these countries can be explained by the fact that sub-Saharan Africa is a region of high endemicity according to the World Health Organization (WHO) [25]. The majority of pregnant women surveyed were aged between 15 – 24 years, i.e. 60.4%, with an average age of 23.55 ± 5.36 years and extremes of 14 and 43 years, including 8.6%. were positive in the HBsAg test .

Intrafamilial transmission at a young age appears to be one of the most important modes of transmission and early detection of infection in pregnant women would make it possible to protect through vaccination all people living under the same roof, as well as that of the partner. Jaundice is a manifestation present in a large number of pathologies. In our study, all HBsAg- positive pregnant women reported a history of jaundice, revealing a statistically significant relationship. This could be explained by the fact that these women suffered from symptomatic acute hepatitis. Bani *et al.* [26]. In Saudi Arabia, they achieved the same result by showing a statistically positive relationship between HBsAg positivity and history of jaundice. It also emerges from the study by Khadidjatou et *al* , that the existence of scarifications was significantly associated with the carriage of HBsAg [ 17]. This same observation was made by Sidibé *et al,* in Mali in 2001 and Angounda *et al.* [27]. In Congo-Brazzaville in 2014. These results can be explained by the fact that certain traditional practices widely spread in our societies are carried out in questionable hygienic conditions. Skin breaks with common equipment during scarification present a risk of direct contact with contaminated blood, thus promoting the transmission of HBV.

*Several authors reported that parity in pregnant women was not associated with HbsAg carriage [ 28,29]. However, in their study carried out in Australia, Kumar V et al found a statistically significant link between parity and HBsAg carriage with a p-value < 0.05 [30],*

**V. Conclusion**

*Our study shows that out of a total of 234 pregnant women tested for hepatitis B, 5 were carriers of HBV, or 2.14%, compared to 229 negative cases, or 97.86%. The 25-33 age group presents 3 positive HBV cases, or 60%. Brides, who were not only the most represented in this study, were also the most affected by HBV with 4 cases, or 80%. Housewives and hairdressers were the most affected by HBV with 2 cases respectively, i.e. a respective prevalence of 20%.*

Vaccination is the most effective means of prevention against this disease which represents the second cause liver cancer​ in the world after tobacco. The low level of knowledge of the women tested on HBV, particularly on prevention (routes of contamination, risky practices and vaccine) reflects the state of knowledge of the virus in the majority of the country's populations.

The implementation of radio and television awareness flashes on the circulation of HBV and the existence of the vaccine could help the general population to adopt responsible behavior in order to avoid the transmission of this virus within our populations.

In summary, this study is part of an investigation campaign into the circulation of HBV among pregnant women in the Télimélé prefecture.

**VI. Conflicts of interest:** none.

**VII Author contributions:** All authors contributed to the completion of this study. They read and approved the final version of the manuscript.

**VII. Thanks**

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**Bibliography**

[1] WHO, 2016: Global health sector strategy for viral hepatitis 2016-2021;

[2] <http://hepatoweb.com/hepatite-B-grossesse.php> [Online]. [Consulted on 12/12/2020 at 2:30 p.m.];

[3 *]. Alassan KS, Imorou RS, Sonombiti H, Salifou K, Ouendo EM. Seroprevalence and factors associated with viral hepatitis B among pregnant women in Parakou in the Republic of Benin. Pan Afr Med J. 2019;33.*

*[4 ] Boushab BM, Mohamed Limame OCM, Fatim Zahra FM, Mamoudou S, Roseline Darnycka BM, Saliou SM. Estimation of seroprevalence of HIV, hepatitis B and C viruses and syphilis among blood donors in the hospital of Aïoun , Mauritania. Pan Afr Med J. 2017;28:118.*

*[5]. Bittaye M, Idoko P, Ekele BA, Obed SA, Nyan O. Hepatitis B virus sero -prevalence among pregnant women in the Gambia. BMC Infect Dis. 2019;19(1 ): 1-8.*

[ 6]- [https://www.who.int/media centre/ factsheets /fs204/ en /](https://www.who.int/media%20centre/factsheets/fs204/fr/) .2017 ‹‹ WHO report | hepatitis B ››, WHO. [Online]. [Consulted March 25, 2019];

[ 7 *]- . World Health Organization Global hepatitis report. World Health Organization. 2017.*

*[ 8]- . Norah Terrault A, Miriam Levy T, Ka Wang Cheung, Gonzague Jourdain. Viral hepatitis and pregnancy. Nature Reviews Gastroenterology Hepatology. 2021;18(2):117–130. [* [*PubMed*](https://pubmed.ncbi.nlm.nih.gov/33046891) *] [* [*Google Scholar*](https://scholar.google.com/scholar_lookup?journal=Nature+Reviews+Gastroenterology+Hepatology&title=Viral+hepatitis+and+pregnancy&author=A+Norah+Terrault&author=T+Miriam+Levy&author=Cheung+Ka+Wang&author=Jourdain+Gonzague&volume=18&issue=2&publication_year=2021&pages=117-130&pmid=33046891&) *]*

*[ 9]- . Philipe Sogni . Pregnancy and viral hepatitis B and C. La Presse Médicale. 2015;44(6 Part 1):654–659. [* [*PubMed*](https://pubmed.ncbi.nlm.nih.gov/26033559) *] [* [*Google Scholar*](https://scholar.google.com/scholar_lookup?journal=La+Presse+M%C3%A9dicale&title=Grossesse+et+h%C3%A9patites+virales+B+et+C&author=Sogni+Philipe&volume=44&issue=6+Part+1&publication_year=2015&pages=654-659&pmid=26033559&) *]*

*[10]- . Noele Nelson P, Philippa Easterbrook J, Brian McMahon J. Epidemiology of hepatitis B virus infection and impact of vaccination on disease. Clinical Liver Disease. 2016;20(4):607–628. [* [*PMC free article*](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5582972/) *] [* [*PubMed*](https://pubmed.ncbi.nlm.nih.gov/27742003) *] [* [*Google Scholar*](https://scholar.google.com/scholar_lookup?journal=Clinical+Liver+Disease&title=Epidemiology+of+hepatitis+B+virus+infection+and+impact+of+vaccination+on+disease&author=P+Noele+Nelson&author=J+Philippa+Easterbrook&author=J+Brian+McMahon&volume=20&issue=4&publication_year=2016&pages=607-628&) *]*

*[11]- . Mr. Ben Hadj Boudali. Hepatitis B in Tunisia. Epidemiology, risk factors and impact of vaccination. Journal of Epidemiology and Public Health. Vol 67 - No. S3 P. S158 - May 2019. doi : 10.1016/j.respe.2019.03.037*

*[12] Ngalula MT, Mukuku O, Kitenge FM, Kakoma J-BS. Preliminary study of seroprevalence and risk factors for hepatitis B virus infection among pregnant women in Lubumbashi, Democratic Republic of Congo nd . :5, in 2018;*

*[13] Niang M, Fall K, Mbengue B, Mbow M, Diouf N, Boye O, et al. Immunological Status to Hepatitis B Virus of Pregnant Women in Dakar, Senegal. Open J Immunol 2017; 07:37–44. https://doi.org/10.4236/oji.2017.72003.*

*[14] Alassan KS, Imorou RS, Sonombiti H, Salifou K, Ouendo EM. Seroprevalence and factors associated with viral hepatitis B among pregnant women in Parakou in the Republic of Benin. Pan Afr Med J 2019;33:226. https://doi.org/10.11604/pamj.2019.33.226.19429.*

[15] WHO, Daytime Worldwide of Hepatitis [https://news.un.org,](https://news.un.org/) 28 July 2023);

*[16] Makanera A, Dramou I, Sidibe S, Conde M, Sy O, Camara LB, et al. Seroprevalence of HIV/hepatitis B virus co -infection at the Sino-Guinean Friendship Hospital (HASIGUI) Kipé /Conakry J Appl Biosci 2019;135:13798–807. (Guinea). J Appl Biosci 2019; 135:13798–807.* [*https://doi.org/10.4314/jab.v135i0.6*](https://doi.org/10.4314/jab.v135i0.6) *.*

[17] [Khadidjatou Saké Alassan](https://pubmed.ncbi.nlm.nih.gov/?term=Alassan%20KS%5BAuthor%5D) , 1,& [Rachidi Sidi Imorou](https://pubmed.ncbi.nlm.nih.gov/?term=Imorou%20RS%5BAuthor%5D) , 2 [Honorat Sonombiti](https://pubmed.ncbi.nlm.nih.gov/?term=Sonombiti%20H%5BAuthor%5D) , 2 [Kabibou Salifou](https://pubmed.ncbi.nlm.nih.gov/?term=Salifou%20K%5BAuthor%5D) , 2 and [Edgar-Marius Ouendo](https://pubmed.ncbi.nlm.nih.gov/?term=Ouendo%20EM%5BAuthor%5D) 3 **:** Seroprevalence and factors associated with viral hepatitis B among pregnant women in Parakou in the Republic of Benin. [Pan Afr Med J.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6814903/) 2019; 33: 226;

[18] Mast EE, Margolis HS, Fiore AE, Brink EW, Goldstein ST, Wang SA et al. Comprehensive Vaccination Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP) Part 1: Vaccination of Infants, Children, and Adolescents . MMWR Recomm Rep. December 23, 2005; 54 (RR-16): 1-31. [ [PubMed](https://pubmed.ncbi.nlm.nih.gov/16371945) ] [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=MMWR+Recomm+Rep&title=comprehensive+immunization+strategy+to+eliminate+transmission+of+hepatitis+B+virus+infection+in+the+United+States:+recommendations+of+the+Advisory+Committee+on+Immunization+Practices+(ACIP)+part+1:+immunization+of+infants,+children,+and+adolescents&author=EE+Mast&author=HS+Margolis&author=AE+Fiore&author=EW+Brink&author=ST+Goldstein&volume=54&issue=RR-16&publication_year=2005&pages=1-31&) ];

[19] World Health Organization Hepatitis B Vaccines. Epidemiological survey weekly . 2017; 92:369-392. [ [PubMed](https://pubmed.ncbi.nlm.nih.gov/28685564) ] [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=Relevé+épidémiologique+hebdomadaire&title=Vaccins+anti-hépatite+B&volume=92&publication_year=2017&pages=369-392&pmid=28685564&) ];

[20] Bigot KA, Kodjoh N, Zohoun IS, Hountondji A, Latoundji S, Takpara L, et al. Seroprevalence of HBs antigen of hepatitis B virus in pregnant women and their children. Med Afr Black. 1992; 39(7):487-90. [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=Med+Afr+Noire&title=Séroprévalence+de+l'antigène+HBs+du+virus+de+l'hépatite+B+chez+les+femmes+enceintes+et+leurs+enfants&author=KA+Bigot&author=N+Kodjoh&author=IS+Zohoun&author=A+Hountondji&author=S+Latoundji&volume=39&issue=7&publication_year=1992&pages=487-90&) ];

[21] Kodjoh N. Situation of the fight against hepatitis B and C in Africa. Med Trop. 2015; 22:141-144. [ [PubMed](https://pubmed.ncbi.nlm.nih.gov/26039152) ] [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=Med+Trop&title=Situation+de+la+lutte+contre+les+hépatites+B+et+C+en+Afrique&author=N+Kodjoh&volume=22&publication_year=2015&pages=141-144&) ];

[22] Candotti D, Danso K, Allain JP. Maternal-fetal transmission of hepatitis B virus genotype E in Ghana, West Africa. J Gén Virol . 88 (part 10): 2686-95. 2007 [ [PubMed](https://pubmed.ncbi.nlm.nih.gov/17872520) ] [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Gen+Virol&title=Maternofetal+transmission+of+hepatitis+B+virus+genotype+E+in+Ghana,+west+Africa&author=D+Candotti&author=K+Danso&author=JP+Allain&volume=88&issue=Pt+10&publication_year=2007&pages=2686-95&pmid=17872520&) ];

[23] - Christiane A., technological activity in hematology and immunology, Aquitaine, 2004;

[ 24 Bougoudogo F, Diarra S, Traoré S, et al. Report on the seroprevalence of markers of hepatitis B virus infection in Mali. 2001;

[25] Jemni L, Chatti N. Epidemiology of hepatitis B virus infection in Tunisia. Maghreb Med 1994; 278: 15-18;

[26] Bani I, Mahfouz MS, Maki E, Gaffar A, Elhassan I, Yassin AO, et al. Prevalence and risk factors of hepatitis B virus in pregnant women in the Jazan region -Kingdom of Saudi Arabia. J Biol Agr Health . 2012 ; 2 (7): 39-43. [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=J+Biol+Agr+Healthcare&title=Prevalence+and+risk+factors+of+Hepatitis+B+Virus+among+pregnant+women+in+Jazan+Region-Kingdom+of+Saudi+Arabia&author=I+Bani&author=MS+Mahfouz&author=E+Maki&author=A+Gaffar&author=I+Elhassan&volume=2&issue=7&publication_year=2012&pages=39-43&) ].

[27] Angounda BM, Bokilo A, Boumba LMA, Itoua C, Ahombo G, Moukassa D, et al. Prevalence of serological markers and risk factors for hepatitis B virus among pregnant women in Brazzaville, Congo. International Journal of Science and Research (IJSR) 2016; 5(1):1907-1912. [ [Google Scholar](https://scholar.google.com/scholar_lookup?journal=International+Journal+of+Science+and+Research(IJSR)&title=Prevalence+of+serologic+markers+and+risk+factors+for+Hepatitis+B+virus+among+pregnant+women+in+Brazzaville,+Congo&author=BM+Angounda&author=A+Bokilo&author=LMA+Boumba&author=C+Itoua&author=G+Ahombo&volume=5&issue=1&publication_year=2016&pages=1907-1912&) ] ;

*[28] Amsalu A, Ferede G, Eshetie S, Tadewos A, Assegu D. Prevalence, Infectivity, and Associated Risk Factors of Hepatitis B Virus among Pregnant Women in Yirgalem Hospital, Ethiopia: Implication of Screening to Control Mother-to-Child Transmission . J Pregnancy 2018;2018:1–8 .* [*https://doi.org/10.1155/2018/8435910*](https://doi.org/10.1155/2018/8435910) *.*

*[29] Abongwa Le, Kenneth P. Assessing prevalence and risk factors of hepatitis b surface antigen among pregnant women attending antenatal clinic in the northwest region of cameroon 2016;4:12.*

*[30] Giles M, Visvanathan K, Lewin S, Bowden S, Locarnini S, Spelman T, et al. Clinical and virological predictors of hepatic flares in pregnant women with chronic hepatitis B. Gut 2015;64:1810– 5. https://doi.org/10.1136/gutjnl-2014-308211.*