



Entrepreneurial &  
Skilled Education  
for the Future



Volume 5, Issue 2 - MAY 2026

# IQ RESEARCH

A Quaterly Journal

ISSN: 2790-4296 (Online)

ISBN: 978-9956-504-74-9 (Print)

Published by IQRJ publications  
[www.iqresearchjournal.com](http://www.iqresearchjournal.com)



## EDITORIAL BOARD

### *Editor-in-Chief*

- ◆ Atanga D. Funwie (Professor) — Kesmonds International University / Nile University of Science & Technology / Green Hope University Somalia

### *Deputy Editor-in-Chief*

- ◆ Dr. Mvogo Eloundou Guy Dieudonné, PhD, Public Health, Tropical Medicine and Infectious Diseases / Kesmonds International University

### *Associate Editor-in-Chief*

- ◆ Tchouaffe Tchiadje Norbert (Professor) — Kesmonds International University / Massachusetts Institute of Technology USA / Pan African University

### *Editorial Assistants*

- ◆ Professor Tchakounte Franklin — Kesmonds International University / University of Ngaoundere
- ◆ Professor Akah Roland Tiagha — Kesmonds International University / Walter Sisulu University South Africa
- ◆ Professor Guiherme Schneider — Mexico
- ◆ Professor Charles Fokunang — Cameroon Ethics Society / University of Yaounde 1
- ◆ Professor Tassang Ndah Andrew — Kesmonds International University / University of Buea
- ◆ Professor Daniel Tata — Switzerland
- ◆ Professor Truly Bush — Germany
- ◆ Professor Abraham Pius — The Academy of Advance Science, United Kingdom
- ◆ Professor Celestina Neh Tassang — University of Buea
- ◆ Professor Letlole Gabriel Gonnafela — Gonnafela Institute South Africa / Kesmonds International University
- ◆ Professor Patricia Samkia Asongwe — Ministry of Higher Education Cameroon
- ◆ Professor Sama Dobit — University of Yaounde I
- ◆ Professor Tony Ogiemen — American Heritage University of Southern California, USA
- ◆ Professor Gabriel Lopes — Unilogos University, USA and Brazil
- ◆ Professor Nukenine Elias — University of Ngaoundere
- ◆ Professor Neossi Guena Mathurin — University of Ngaoundere / Ngaoundere Regional Hospital
- ◆ Professor Angwanade Wilson — University of Ngaoundere
- ◆ Professor Esther Ngah — University of Ngaoundere
- ◆ Professor Yongho Shiwoh Louis — Kesmonds International University
- ◆ Professor Asakizi Nji Augustine — Kesmonds International University / University of Bamenda Cameroon
- ◆ Professor Rudolph Q. Kwanue — Rudolph Kwanue University Liberia
- ◆ Professor Mustaf Abdulle — President Green Hope University Somalia
- ◆ Professor Mathan Muse — Green Hope University Somalia / Nile University of Science & Technology
- ◆ Professor Lawrence Mwelwa — Queens College Zambia
- ◆ Professor Ibrahim Abdi — Green Hope University Somalia / Nile University of Science & Technology
- ◆ Professor Hussein Tohow — VC Green Hope University Somalia
- ◆ Professor Henry N. Fonjock — Cameroon Cooperative Credit Union
- ◆ Professor Zahir Shah — Professional Development Research Institute Pakistan
- ◆ Professor Brian Siamani — Dean Faculty of Medicine, Gideon Roberts University Zambia
- ◆ Professor Ernest Mutale — Ministry of Health Zambia
- ◆ Professor Kouam Lawrence — Kesmonds International University / University of Ngaoundere
- ◆ Professor Pascal Scheneller — Germany
- ◆ Professor Francis Pol Lim — Philippine
- ◆ Professor Mvondo M. Manuella — Kesmonds International University / University of Ngaoundere
- ◆ Professor Tamo Simo Richard — Kesmonds International University / University of Ngaoundere
- ◆ Professor Fodouop Simeon Pierre Tchegaing — Kesmonds International University / University of Ngaoundere
- ◆ Professor Elie Baudelaire — EMIE Business School Paris France
- ◆ Professor Sundjo Fabien — Kesmonds International University / University of Bamenda
- ◆ Professor Gidoen Mwanza — Gidoen Robert University Zambia

- ◆ Dr. Christina Jean Rahm — Institute of Clinical Research USA
- ◆ Dr. Oscar Monono — Ballbridge University
- ◆ Dr. Feugueng Micheal — Kesmonds International University United Kingdom
- ◆ Dr. Penya Elvis Che — Kesmonds International University / St John Paull II University Cameroon
- ◆ Dr. Shei Claude Nfor — Shalom Institute Cameroon
- ◆ Dr. Kabonbe Achile — Kesmonds International University / University of Ngaoundere
- ◆ Dr. Doudou Raisa — Ministry of Scientific Research Cameroon
- ◆ Dr. Zilefac Ebenezer Nwetlagwung — Kesmonds International University / Southeast University China

### **Editorial Secretaries**

- ◆ Gana Christophe — Kesmonds International University
- ◆ Kalwa Yvette — Kesmonds International University
- ◆ Eng. Benson Lugalia — Kesmonds Group Limited
- ◆ Eng. Pokam Tchinda Martial — Kesmonds International University / University of Ngaoundere
- ◆ Dr. Kelly Kesten Manyi Atanga — Kesmonds International University / Jining Medical University, China
- ◆ Dr. Pauline Wanjiru Gititha — Kesmonds International University
- ◆ Dr. Eng. Anyangwe C. Anyangom — Kesmonds Group Limited, Kesmonds Institute of Technology

### **Editorial Board Members**

- ◆ Prof. Nicolas Guanzon Ong, Ph.D. — Department of Teaching Languages, University of Science and Technology of Southern Philippines
- ◆ Prof. Ibrahim Hussein — Kesmonds Research Institute Uganda
- ◆ Prof. Zapryan Assen — Higher School of Security and Economics, Plovdiv
- ◆ Prof. Surendra Kumar Gautam — Department of Chemistry, Tri-Chandra Campus, Tribhuvan University, Kathmandu, Nepal
- ◆ Prof. SENHADJI L. — Oran University Hospital, Department of Anesthesia-Intensive Care
- ◆ Prof. Sabyasachi Pramanik — Department of Computer Science and Engineering, Haldia Institute of Technology
- ◆ Prof. Meron Mersha — Quantum Optics and Information, Arba Minch University, Ethiopia
- ◆ Prof. Dr. Zahir Shah — Kesmonds Research Institute, Pakistan
- ◆ Prof. Dr. Bond Richard — California South University (CSU), Irvine, California, USA
- ◆ Prof. Dr. Abubakar Mohammad — University of Technology, Baghdad, Iraq
- ◆ Prof. Charlanne Miller — LIGS University Hawaii, Canada
- ◆ Prof. Ali Usman — (Ethiopia)
- ◆ Prof. Ali Abdul-Hussain Ghazzay — Department of Biology, University of AL-Qadisyah, Iraq
- ◆ Prof. Nana Anabel — (Ghana)
- ◆ Dr. Leonard Ake — Maitre-Assistant du CAMES, Enseignant-chercheur, Universite Boubacar Ba de Tillaberi
- ◆ Dr. Wilson Dabuo Wiredu — MOCS, VC Academics Affairs, DMTU, Ghana
- ◆ Dr. Wansso Blakwe Ahmed
- ◆ Dr. Vijay Ramkisan Lakwal — Department of Zoology, Science and Commerce College, Jalgaon (MS), India
- ◆ Dr. Veronica Blade — (Algeria)
- ◆ Dr. Velinga Ndolok Aime Cesaire — Ph.D. in Public Health Epidemiology, UNDP Public Health Development Program
- ◆ Dr. Uthman Simeon Adebisi — Obafemi Awolowo University, Nigeria
- ◆ Dr. Tumi Humphred Simoben — Ph.D. in Public Health, Kesmonds Research Institute
- ◆ Dr. Toffic Abdel Hassan — Plant Protection Research Institute, Agricultural Research Center
- ◆ Dr. Thomas Abraham — Department of Hotel Management, Gondar, Ethiopia
- ◆ Dr. Tchifam Berthe — Ph.D. in Public Health Epidemiology, Faculty of Medicine Garoua Cameroon
- ◆ Dr. Tatoh Adeline Manjuh — Ph.D. in Healthcare Administration, Limbe Referral Hospital Cameroon
- ◆ Dr. Tateukam Alphonse — Doctor of Clinical Medicine, Kesmonds Research Institute
- ◆ Dr. T. Christina Mondimu — University of Gondar, Ethiopia
- ◆ Dr. Surachita Basu — (Bangalore, India)
- ◆ Dr. Sujita Darmo, ST., MT — Mechanical Engineering, Mataram University, Indonesia
- ◆ Dr. Shehuri Sharon — Department of Botany, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria
- ◆ Dr. Rofrigo Jose Pablo — Universidad Empresarial De Costa Rica
- ◆ Dr. Rintu Sayak — (India)
- ◆ Dr. Resham Kumari — Professor Assistant of Agricultural Zoology, Plant Protection Department, Sohag University, Egypt
- ◆ Dr. Renato Dan A. Pablo II — CSPE, Mabalacat City College

- ◆ Dr. Ranendu Dutta Pukayastha — S.J.N.P.G College, Lucknow, India
- ◆ Dr. Rajinder Singh Sodhi — Guru Kashi University, Ilorin, Nigeria
- ◆ Dr. Rajat Mrinal Kanti, PhD, D. LITT — Physiotherapist, NIMHANS, Bangalore, India
- ◆ Dr. Rafah Almutarreb — School of Computer Science and Technology, Algoma University, Canada
- ◆ Dr. Rabindra Das Sinha — (Chennai, India)
- ◆ Dr. R. Francis Kaundra — DMI-St. Eugene University, Great North Road, Chibombo District, Lusaka, Zambia
- ◆ Dr. Priyanka Weerasekara — Faculty of Social Sciences & Languages, Sabaragamuwa University of Sri Lanka
- ◆ Dr. Pawan Thapa — Department of Geomatics Engineering, School of Engineering, Kathmandu University, Nepal
- ◆ Dr. Osman Ibrionke — Abia State University Uturu, Nigeria
- ◆ Dr. Osama Mohamed Anwar Nofal — Emeritus Professor, National Research Centre
- ◆ Dr. Onwubere Isabella — Sub-Dean, Samuel Obiajulu University, Osun State, Nigeria
- ◆ Dr. Onodugu Obinna Donatus — Department of Mathematics, Faculty of Physical Sciences, Abia State University, Nigeria
- ◆ Dr. Ola Sayed Mohamed Ali — Girls-AL-Azhar University, Cairo
- ◆ Dr. Okpala Sunday Ocheni — University of Mosul, College of Science, Biology Dept.
- ◆ Dr. Obike Godwill Ukamaka, M.Sc, Ph.D. — (Medical Microbiology), Jos, Plateau State, Nigeria
- ◆ Dr. Obafemi Emmanuel — Adekunle Ajasin University Akungba Akoko, Ondo State
- ◆ Dr. Nzuzi Rafael — Bakhita African Schools, Butembo
- ◆ Dr. Nwatu Celestine Chibuzu — Rivers State University, Nigeria
- ◆ Dr. Nouma Simon Joachim — Ph.D. in Political Economics, Consultant and Auditor Bank of Central African States
- ◆ Dr. Ngwa Mathias — Faculty of Laws and Political Sciences, University of Dschang, Cameroon
- ◆ Dr. Nazar Hassan — PMAS Arid Agriculture University, Rawalpindi
- ◆ Dr. Nadia Jamil — Department of Environmental Sciences, Hazara University, Mansehra
- ◆ Dr. Mulani Moshin Anware — Sant Ramdas Art's, Commerce and Science College, Maharashtra
- ◆ Dr. Muhammad Farooq — Assistant Professor (Economics), Okara University, Pakistan
- ◆ Dr. Mohammad Usman Awan — Centre for Biotechnology and Microbiology, University of Swat
- ◆ Dr. Mohamed Mustaf Abdulle — Green Hope University Somalia / Nile University of Science & Technology
- ◆ Dr. Mochammad Munir Rachman, M.Si. — PGRI Adi Buana University Surabaya, Indonesia
- ◆ Dr. Mahmoud Magdy Abbas — Plant Nutrition Dept., Dokki, Giza, Egypt
- ◆ Dr. Lukong Hubert Shalanyuy — Kesmonds Research Institute
- ◆ Dr. Liela Meta — Malla Reddy Institute of Technology and Science
- ◆ Dr. Kheambo Didier — Ph.D. in Healthcare Administration, Kesmonds Research Institute
- ◆ Dr. Khan Aneeka Habib — College of Business Administration, International University of Business Agriculture and Technology, Dhaka, Bangladesh
- ◆ Dr. Kabul Amid Aabbasi — University of Karachi, Pakistan
- ◆ Dr. Jesica Gate — (France)
- ◆ Dr. Javnyuy Joybert, MBA, DBA — CEO CELBMD Africa, Douala Cameroon
- ◆ Dr. Jason Chishime Mwanza — St. Eugene University, Lusaka, Zambia
- ◆ Dr. Ilayaraja Degu Kathirkaman — Department of Geology, Gondar, Ethiopia
- ◆ Dr. Ibrahim Mohammad Almoselhy — Food Science and Technology, Faculty of Agriculture, Ain Shams University, Cairo, Egypt
- ◆ Dr. Hossain Johangir — Bangladesh
- ◆ Dr. Habiba Aissatou — (Egypt)
- ◆ Dr. Geoffrey Kingibe — Department of Sustainable Agriculture, Tamale Technical University, Tamale
- ◆ Dr. Frederick Mbogo Akoth, PhD — Department of Computer Science and Software Engineering, Bondo, Kenya
- ◆ Dr. Francis Onyango, Ph.D. — Nairobi, Kenya
- ◆ Dr. Fitsum Etefa — Ethiopian Institute of Textile and Fashion Technology [EiTEX], Ethiopia
- ◆ Dr. Farhat Samreen — Federal Urdu University of Arts, Karachi, Pakistan
- ◆ Dr. Fahid Faryal Yawar — Kabul Polytechnic University, Kabul, Afghanistan
- ◆ Dr. Fadekemi Williams Oyewusi — Imo State Polytechnic, Umuagwo, Nigeria
- ◆ Dr. Ezedimora Louise Ocheni — School of Special Education, Federal College of Education, Oyo, Oyo State
- ◆ Dr. Emmanuel Muhairwa — Dodoma University of Dodoma, Tanzania
- ◆ Dr. Emilia Kheambo, CPA(Z) — Senior Lecturer, Faculty of Commerce, GSBM
- ◆ Lecture, Bijay Nera Poudel — Tribhuvan University, Trichandra Multiple Campus, Department of Psychology, Kathmandu, Nepal
- ◆ Dr. Emili Burnley — (Canada)
- ◆ Dr. Doudou Nafissatou — Ministry of Scientific Research Cameroon

- ◆ Dr. Djibrilla Yaouba — World Bank Public Health Development Program Northern Cameroon / University of Ngaoundere Cameroon
- ◆ Dr. Desmond Olushola — Microbiology Department, Kogi State University, Anyigba
- ◆ Dr. Deric Chang Tektook — Iraq
- ◆ Dr. Debashi Panna — India
- ◆ Dr. David Dowland — Habibullah Bahar University College, Dhaka
- ◆ Dr. Danish Armed, Joel Caleb — Uturu
- ◆ Dr. Celestine Mulugeta Degu — College of Business and Economics, Wollega University
- ◆ Dr. Camile Rodriguezz — (Malaysia)
- ◆ Dr. Biokgololo Abeltine — Faculty of Commerce & Business Administration, Gaborone University College, Botswana
- ◆ Dr. Bella Perez — (Canada)
- ◆ Dr. Bashir Zainab — Social Studies Department, Tai Solarin College of Education, Omu-Ijebu, Ogun State, Nigeria
- ◆ Dr. Baratha Dewannara — Bolton University, (UK) (Sri Lankan Branch)
- ◆ Dr. Baba Batoure — Ph.D. in Health Economics, Director State Registered Nursing School Garoua Cameroon
- ◆ Dr. Aya Khalil Ibrahim Hassan Moussa — Biological Anthropology Department, Medical Research Division, Cairo, Egypt
- ◆ Dr. Asanath Dira — (Cairo, Egypt)
- ◆ Dr. Ambarish Sachin Bhalandhare — Associate Professor of Economics, India
- ◆ Dr. Ali Zehra Zaida — Guru Kashi University, Bathinda, Punjab
- ◆ Dr. Ali Mushin Haji — Dean of College of Science, Al-Karkh University of Science, Baghdad, Iraq
- ◆ Dr. Akinsola Gloria Adedjoja M. Hamed — Department of Mathematics, Yobe State University, Damaturu, Nigeria
- ◆ Dr. Adeshini Goke Francis — Al-Hikmah University, Ilorin, Nigeria
- ◆ Dr. Adda Goudougou — Garoua General Hospital Cameroon
- ◆ Dr. Abrima Francis — Post-Doctoral Researcher, American International University West Africa, The Gambia
- ◆ Dr. Abraham Aziz — (Bangalore, India)
- ◆ Dr. Abhishek B. — Assistant Professor, SRM University, Kattankualthur, Chennai, India
- ◆ Chan Dong Hyun, Bs, Ms, Ph.D., Geology — The Chinese University of Hongkong
- ◆ Dr. Abdul Malik — Minhaj University, Lahore, Pakistan
- ◆ Dr. Abdul Hussain — Department of Botany, GPGC Parachinar, District Kurram
- ◆ Dr. (Mrs.) T V Sanjeevanie — General Sri John Kotelawala Defence University, Sri Lanka
- ◆ Dr. Mubeena Munir — Oromia State University and Jimma University
- ◆ Dr. Lingbe Soconde — Kesmonds International University / University of Garoua Cameroon
- ◆ Dr. Garam Garam — Kesmonds International University / University of Garoua Cameroon
- ◆ Dr. Edward Mutengechi — Makere University, Mulago Hospital Uganda
- ◆ Dr. Awah Richard Ndo — Cameroon Cooperative Society
- ◆ Dr. Abel Tadesse Belle K. — Jigjiga University, Jigjiga, Ethiopia
- ◆ Alobwede Pende Divine — Kesmonds International University
- ◆ Aissatou Missira — Kesmonds International University
- ◆ Paule Giovani Henriette — Kesmonds International University
- ◆ Nsuh Larissa — Kesmonds International University
- ◆ Nougho Nancy Merveille — Kesmonds International University
- ◆ Nfon Sergius Nfon — Kesmonds International University / University of Garoua Cameroon
- ◆ Ndapeyouene M. Zenabou — Kesmonds International University
- ◆ Mbanwie Nadege Ambeck
- ◆ Kalwa Yvette, Kesmonds International University
- ◆ Gana Christophe, Kesmonds International University



Entrepreneurial  
Education for a  
Changing Society



## Table of Contents

---

Identifying pregnancy risks complications due to maternal-fetal HBV and HCV at the Bertoua Regional Hospital in the East Region of Cameroon. .... **56**



## Identifying pregnancy risks complications due to maternal-fetal HBV and HCV at the Bertoua Regional Hospital in the East Region of Cameroon

Tatiana Jiengoué<sup>a</sup>, Olivier Lieuga<sup>a</sup> and Augustine Nji Asakizi<sup>a</sup>

### Affiliations

- a. <sup>a</sup> School of Health and Biomedical Sciences, Kesmonds International University of America

### ABSTRACT

Results from a seven-year nationwide inpatient sample study demonstrate that HBV and HCV viruses are each associated with pregnancy complication. Maternal HBV or HCV carrier status is a cause for concern regarding both the course of pregnancy and the short-term perinatal outcomes. Previous data conflict regarding the association of chronic HBV and HCV with adverse pregnancy outcomes, according to investigator Bing Chen, who presented the findings at the American Association for the study of liver Diseases. The main aim of this study is to identify HBV/HCV pregnancy risks complications. This cross-sectional study at Bertoua Regional Hospital of Cameroon (June 2025-January 2026) aimed at identifying pregnancy risks complications due to maternal-fetal HBV and HCV at the Bertoua Regional Hospital in Cameroon of pregnant women attending the maternity unit. The majority of them (62%) were aged within (19-28). (86.20%) of the pregnant women who were tested positive had experienced low birth weight, (79.31%) have known preterm birth, (68.76%) had been admitted to the Neonatal intensive care unit while (65.51%) had children with congenital abnormalities, pregnant women having HCV were likely to develop risks complications like preterm birth, low weight birth due to the fact that HCV is generally associated with a higher risk of adverse pregnancy complications compared to HBV particularly regarding neonatal outcomes. However, data identifying maternal-fetal HBV and HCV pregnancy risks complications among pregnant women across both community and healthcare settings remain limited, pregnant women are sometimes unaware of their pregnancy risks in their conditions; hence the need of this research study which goes in straight line with the World Health Organization elimination goals on viral Hepatitis.

**Keywords:** *Identifying, Pregnancy, Risks complications, Maternal-fetal, Viral Hepatitis B and C, Cameroon*

### Corresponding Author:

Tatiana Jiengoué Tchakonang

Email:

[jiengouetatiana@kesmondsuniversity.org](mailto:jiengouetatiana@kesmondsuniversity.org)

Paper ID: IQRJ-V05102-26005009

## 1. INTRODUCTION

HBV and HCV are acquired by contaminated blood product exposure, sexual activity or perinatal transmission. Although the prevalence of HBV is relatively low, in the US and generally with approximately 1 million Americans are chronically infected by HBV (Sorell MF et al 2009), it is more prevalent in East Africa (8%) (Ott JJ et al 2011), Southeast Africa and India 1 to 66% and Sub-Saharan Africa (8 to 12%) (Ott JJ et al 2011).

Globally, HBV and HCV cause chronic infections in 254 million and 50 million persons worldwide respectively and these diseases result in 1.1 million and 242.00 deaths annually respectively (WHO 2024). In developing countries like Asia and Africa, HBV and HCV infections are common (WHO 2016), the WHO reported that there were 1.2 million and 10 new cases of chronic HBV and HCV infections worldwide in 2022 respectively (WHO 2024). According to the WHO estimates between 3 and 4 million people acquired the disease annually with the majority of cases occurring in Africa (Schweitzer et al 2025) other evidence also showed that an estimated 7.1 million people are infected with HCV worldwide (Global Hepatitis Report 2017). Despite being highly contagious, HBV and HCV are still underdiagnosed and underreported in the majority of African countries (WHO 2013). Both HBV and HCV have the potential to be widespread and impact a variety of populations, such as those with HIV, healthcare professionals, the general population of blood donors, pregnant mothers and their children (Coppola N et al 2016). Numerous studies show that the prevalence of HBV and HCV in pregnant women is now seriously associated with public health (Pabsu R et al 2018). Mother-to-child transmission of HBV, which might be through

intrauterine transmission is a common event and causes chronic infection of the virus (Zhao et al 2022). The seroprevalence of HBV among pregnant women in Ethiopia ranges from 4.5 to 7.9% which is indicative of an intermediate degree of endemicity for the virus (Umare A et al 2026). The seroprevalence of HCV, which ranges from 0.26 to 8.07% was shown to be lower than that of HBV in the majority of Ethiopian studies (Bafa TA et al 2020). The seroprevalence of HBV and HCV among pregnant women in Cameroon is high with studies reporting rates generally ranging from 5% to over 16% (Mbongue-Mikangue et al 2024). Childbearing women can potentially transmit HBV and HCV to their children, they transmit an infection to newborns usually during birth following close contact. There is a higher likelihood of vertical transmission of infection from mothers to offspring in 4.6% and 1.6% of babies delivered to pregnant women with HBV and HCV infections respectively (Dagnew et al 2020). New-borns who are exposed to HBV will have almost 85-90% risk of developing chronic liver disease (Brian J. Mc Mahon et al 1990).

Preterm delivery, placental separation, vaginal bleeding, early rupture of the membranes and mortality are among the many issues that can arise from maternal infection with HBV and HCV during pregnancy (Reddick K, et al 2011). A significant risk of neonatal hepatitis is also linked to it, and this can result in liver cirrhosis and hepatocellular cancer in young adulthood (Zahran et al 2010), even though viral hepatitis screening is advised during routine ANC, it is not always effective in some healthcare facilities in Cameroon. Recent research showed that both the general population and healthcare professionals reported having little knowledge of the hepatitis virus and its risks complications

on pregnancy (Shiferaw F 2016). Therefore, this study aimed at identifying the pregnancy risks complications due to HBV and HCV of pregnant women attending antenatal classes at the Bertoua Regional Hospital, in other words, what knowledge do pregnant women have as far as HBV and HCV is concerned in their condition?

## 2. RELATED WORKS

Childbearing women can potentially transmit HBV and HCV to their children, they transmit an infection to new-borns usually during birth following close contact. There is a higher likelihood of vertical transmission of infection from mothers to offspring in 4.6% and 1.6% of babies delivered to pregnant women with HBV and HCV infections respectively (Dagneu et al 2020). New-borns who are exposed to HBV will have almost 85-90% risk of developing chronic liver disease (Brian J. Mc Mahon et al 1990).

A study showed that Preterm delivery, placental separation, vaginal bleeding, early rupture of the membranes and mortality are among the many issues that can arise from maternal infection with HBV and HCV during pregnancy (Reddick K, et al 2011). A significant risk of neonatal hepatitis is also linked to it, and this can result in liver cirrhosis and hepatocellular cancer in young adulthood (Zahran et al 2010), even though viral hepatitis screening is advised during routine ANC, it is not always effective in some healthcare facilities in Cameroon. Recent research showed that both the general population and healthcare professionals reported having little knowledge of the hepatitis virus and its risks complications on pregnancy (Shiferaw F 2016).

## 3. MATERIALS & METHODS

Inclusion criteria were Pregnant women aged of 19 years and above (58) who freely consented,

and came for antenatal care visit at the maternity unit of the BRH, and had not been vaccinated against HBV within the study period; as well, the study excluded pregnant women less than 19 years and non-pregnant women. Those of them who had receive HBV vaccine at the period of the study were also excluded. The prospective health facility-based study setting was chosen because of the required study population of pregnant women who register for regular antenatal care visits. Moreover, data collected at a specific point in time was deemed adequate to establish a diagnosis of HBV virus, hence, justifying the choice of a cross-sectional study design, this is because testing for Hepatitis B and C virus has been made a routine test for all the pregnant women on their antenatal care visit at the Bertoua Regional Hospital and actually were free of charge during the study. A total of 400 pregnant women were consecutively sampled (non-probabilistic) registered for their visit during the study period and all were approached with a request and signed the informed consent to take part in the study, all of them gave their consent to participate in the study and they were consecutively enrolled to the study.

Participants were assigned codes for anonymity purposes, we used for HBV screening Diaspot HBsAg, these are step Hepatitis B Surface Antigen (HBsAg) test strip package insert and for HCV, Diaspot HCV virus anti-body (HCV-Ab) test strips. Those are immune-chromatographic strips for qualitative detection of antibodies and antigens. Their sensitivity and specificity are above 99% and 98% respectively. Results were disclosed to participants with proper counselling; all infected pregnant women were counselled on the disease and referred for proper specialization care while the non-infected were counselled for HBV vaccination.

Data were obtained using a well-structured questionnaire which was designed for the research and for laboratory analysis; questions elicited data to cover the objectives of the study, the questionnaire included seven sections, each focusing on a particular aspect to answer the research questions and gaps as well. The quantitative part of the questionnaire featured MCQ and Likert-scale questions allowing participant to rate their experiences, knowledge, feelings and attitudes. The questionnaires also included open-ended questions inviting participants to give other factors not mentioned. Frequencies (sums and percentages) were calculated for the socio-demographic factors and the different attitudes, feelings and practices towards HBV and HCV.

Tables displaying the frequency distribution for knowledge, attitude and practice towards HBV and HCV were entered into graph, each of the tables had frequencies for knowledge, maternal HBV/HCV preventive modes and practices, modes of transmission. Data were analyzed using Excel 2016 frequencies and percentages were determined.

#### 4. RESULTS & DISCUSSION

*[See Annex — Table 1: Socio-demographic information and prevalence rates among pregnant women attending ANC]*

The results show that among the HBV/HCV women tested positive (29), (79.31%) of them experienced preterm birth in the past due to their conditions, (86.20%) experienced low birth weight of their babies, (65.51%) congenital abnormalities and (68.76%) of them were admitted to the NICU with their babies.

As results, we found out that pregnant women with HBV were significantly more likely to give birth to a baby born preterm (86.20%) and (79.3%) of the babies born to their positive

mothers had a low birth weight (<2500g), (68.76%) were admitted to the NICU and (65.51%) of those babies had congenital abnormalities; HBV and HCV infections during pregnancy are linked to significant maternal and fetal complications including increased risks of preterm birth, low birth weight, gestational diabetes and intrauterine restriction. (Statpearls-NIH 2025) confirmed HBV/HCV increase risks of preterm birth, placental issues and prenatal mortality and maternal HCV is strongly associated with preterm birth, with up to a two-fold increased risks of NICU admission and this in straight line with our findings in which HBV pregnant women are more likely to give birth to a baby born preterm (86.20%). Another study is that of (He et al 2023) which demonstrated that HBV is an independent risk factor for preterm birth and gestational diabetes, HBV infection is associated with an increased risk of GDM, even after adjusting for traditional factors like age and BMI, this is in phase with phase with our study whose results showed that 58.62% of pregnant women living with HBV/HCV are at a higher risk of developing gestational diabetes; our results found that 68.76% of babies born to either HBV/HCV mothers admitted to NICU at birth, this is in phase with the study of (Thakur HS et al 2017) in which 27.27% of pregnant women had their babies admitted to NICU. Also, 65.5% of our HBV/HCV pregnant women were likely to give birth to a baby with congenital abnormalities as it was the case in the study of (Shiyao et al 2019) in which the results showed that pregnant women with HBV infection might be associated with a higher risk of congenital abnormalities.

## 5. CONCLUSION

Maternal-fetal HBV and HCV infections significantly increase the risk of adverse obstetric and neonatal outcomes, including preterm birth, low birth weight, gestational diabetes, and miscarriage. Chronic HBV infection poses a high risk of vertical transmission, particularly with high maternal viral loads, necessitating timely antiviral therapy.

While HBV has established protocols for preventing transmission, further research is needed to better understand the mechanisms of adverse pregnancy outcomes and to optimize the management of HCV in pregnancy.

## REFERENCES

- Alter et al (1976). Type B hepatitis: the infectivity of blood positive for e antigen and DNA polymerase after accidental needle stick exposure, *N. Engl. J. Med.*, 295,909-913.
- Anaedobe et al (2015). Prevalence, Socio-Demographic Features and Risk Factors of Hepatitis B Virus Infection among Pregnant Women in South-western Nigeria. *The Pan African Medical Journal*, 20, 406.
- Ansari, et al (2023). Risk of early horizontal transmission of hepatitis B virus in children of uninfected mothers in sub-Saharan Africa: A systematic review and meta-analysis. *Lancet Glob. Health* 2023,
- Cabot B, et al (1997). Structure of replicating hepatitis C virus (HCV) quasispecies in the liver may not be reflected by analysis of circulating HCV virions. *J Virol*71:1732–1734.
- Delamare, H. et al (2024). Proportion of pregnant women with HBV infection eligible for antiviral prophylaxis to prevent vertical transmission: A systematic review and meta-analysis. *JHEP Rep.* 2024, 6, 101064.
- Di Filippo Villa, et al (2023) D.; Navas, M.C. Vertical Transmission of Hepatitis B Virus-An Update. *Microorganisms* 2023, 11, 1140.
- Ducancelle et al. (2013) High Endemicity and Low Molecular Diversity of Hepatitis B Virus Infections in Pregnant Women in a Rural District of North Cameroon. *PLoS ONE*, 8, e80346.
- Ducancelle et al. (2013) High Endemicity and Low Molecular Diversity of Hepatitis B Virus Infections in Pregnant Women in a Rural District of North Cameroon. *PLoS ONE*, 8, e80346.
- El-Sayed, M. et al (2019). THU-137-DAA therapy in women of child bearing age: accidental conception during therapy and pregnancy outcome [abstract]. *J. Hepatol.* 70, e221 (2019).
- El-Sayed, M. H. & Indolfi, (2020). G. Hepatitis C virus treatment in children: a challenge for hepatitis C virus elimination. *Semin. Liver Dis.* 40, 213–224 (2020).
- European Centre for Disease Prevention and Control (ECDC) (2022) Introduction to the Annual Epidemiological Report. In: ECDC. Annual epidemiological report [Internet]. Stockholm: ECDC; 2022
- European Centre for Disease Prevention and Control (ECDC) (2022) Introduction to the Annual Epidemiological Report. In: ECDC. Annual epidemiological report [Internet]. Stockholm: ECDC; 2022
- European Paediatric Hepatitis C Virus Network. (2005). A significant sex-but not elective cesarean section-effect on mother-to-child transmission of hepatitis C virus infection. *J Infect Dis*192:1872–1879.
- European Paediatric Hepatitis C Virus Network. (2005). A significant sex-but not elective cesarean section-effect on mother-to-child transmission of hepatitis C virus infection. *J Infect Dis*192:1872–1879.
- F. Fiehn, et al (2024). Hepatitis C virus and hepatocellular carcinoma: carcinogenesis in the era of direct-acting antivirals.
- Farooq H.Z. et al (2024). Risk factors for hepatocellular carcinoma associated with hepatitis C genotype 3 infection: a systematic review. *World J. Gastrointest. Oncol.* 2024;16(4):1596612. doi: 10.4251/wjgo.v16.i4.1596. 15 avr.
- Fogel RS, Chappell CA. (2023). Hepatitis C virus in pregnancy: an opportunity to test and treat. *Obstet Gynecol Clin North Am* 50:363–373. doi: 10.1016/j.ogc.2023.02.008
- Fomulu, et al. (2013). Prevalence, Correlates and Pattern of Hepatitis B among Antenatal Clinic Attenders in Yaoundé-Cameroon: Is Perinatal Transmission of HBV Neglected in Cameroon. *MC Pregnancy and Childbirth*, 13, 158.
- Fomulu, et al. (2013). Prevalence, Correlates and Pattern of Hepatitis B among Antenatal Clinic Attenders in Yaoundé-Cameroon: Is Perinatal Transmission of HBV Neglected in Cameroon? *BMC Pregnancy and Childbirth*, 13, 158.
- Freriksen, J. J. M. et al (2019). Review article: direct-acting antivirals for the treatment of HCV during pregnancy and lactation – implications for maternal dosing, foetal exposure, and safety for mother and child. *Aliment. Pharmacol. Ther.* 50, 738–750 (2019).
- Funk, A. et al (2020). Efficacy and safety of antiviral prophylaxis during pregnancy to prevent mother-to-child transmission of hepatitis B virus: a systematic review and meta-analysis. *Lancet Infect Dis.* [https://doi.org/10.1016/S1473-3099\(20\)30586-7](https://doi.org/10.1016/S1473-3099(20)30586-7) (2020)
- G.M. Kassa, et al (2024). Prevalence, trends, and distribution of hepatitis C virus among the general

- population in sub-Saharan Africa: a systematic review and meta-analysis.
- Gross, M. S., Ruth, A. R. & Rasmussen, S. A. (2020). Respect women, promote health and reduce stigma: ethical arguments for universal hepatitis C screening in pregnancy. *J. Med. Ethics* 46, 674–677 (2020).
- Hamadou N.H.M., al (2025). Traitement de l' Hépatite C de Génotype 1 par les antiviraux ; Action Directe au Cameroun : résultats préliminaires. *HEALTH SCIENCES AND DISEASE* [Internet] 2025.
- Honegger JR, et al (2013). Loss of immune escape mutations during persistent HCV infection in pregnancy enhances replication of vertically transmitted viruses. *Nat Med* 19:1529–1533.
- Honegger JR, et al (2013). Loss of immune escape mutations during persistent HCV infection in pregnancy enhances replication of vertically transmitted viruses. *Nat Med* 19:1529–1533.
- Indolfi, G. et al (2019). Hepatitis B virus infection in children and adolescents. *Lancet Gastroenterol. Hepatol.* 4, 466–476 (2019).
- Indolfi, G. et al (2019). Hepatitis C virus infection in children and adolescents. *Lancet Gastroenterol. Hepatol.* 4, 477–487 (2019).
- Jiang, W. et al (2018). Sofosbuvir inhibits hepatitis A virus replication in vitro assessed by a cell-based fluorescent reporter system. *Antivir. Res.* 154, 51–57 (2018).
- Joshi, et al (2020). Presence of Precore (C)/C Promoter Mutants in Peripheral Blood Mononuclear Cells of Chronic Hepatitis B (CHB) Carriers During Pregnancy Does Not Correlate with Increased Risk of Liver Disease in 4 Years of Follow-Up. *Dig. Dis. Sci.* 2020, 65, 204–214.
- Joshi, et al (2020). Presence of Precore (C)/C Promoter Mutants in Peripheral Blood Mononuclear Cells of Chronic Hepatitis B (CHB) Carriers During Pregnancy Does Not Correlate with Increased Risk of Liver Disease in 4 Years of Follow-Up. *Dig. Dis. Sci.* 2020, 65, 204–214.
- Kaberg, M. & Weiland, O (2020). Hepatitis C elimination - macro-elimination. *Liver Int.* 40, 61–66 (2020).
- Khan A., et al (2022). Core amino acid substitutions in HCV-3a isolates from Pakistan and opportunities for multi-epitopic vaccines. *J. Biomol. Struct. Dyn.* Mai. 2022;40(8):375368. doi: 10.1080/07391102.2020.1850353.
- Knegendorf, L. et al (2018). Hepatitis E virus replication and interferon responses in human placental cells. *Hepatol. Commun.* 2, 173–187 (2018).
- Kushner, T. & Terrault, N. A. (2019). Hepatitis C in pregnancy: a unique opportunity to improve the hepatitis C cascade of care. *Hepatol. Commun.* 3, 20–28 (2019).
- L. Bhebhe, M. Anderson, S. Souda, W.T. Choga, E. Zumbika, Z.M. Shaver, et al (2019). Molecular characterization of hepatitis C virus in liver disease patients in Botswana: a retrospective cross-sectional study
- Labarga P, et al (2007). Infant of 22 months of age with no anomalies born from a HCV- and HIV-infected mother under treatment with pegylated interferon, ribavirin and antiretroviral therapy during the first 16 weeks of pregnancy. *Reprod Toxicol* 24:414–416.
- Labarga P, et al (2007). Infant of 22 months of age with no anomalies born from a HCV- and HIV-infected mother under treatment with pegylated interferon, ribavirin and antiretroviral therapy during the first 16 weeks of pregnancy. *Reprod Toxicol* 24:414–416.
- Larouche A, et al (2012). Seronegative hepatitis C virus infection in a child infected via mother-to-child transmission. *J Clin Microbiol* 50:2515–2519.
- Larouche A, et al (2012). Seronegative hepatitis C virus infection in a child infected via mother-to-child transmission. *J Clin Microbiol* 50:2515–2519.
- Law M, et al (2008). Broadly neutralizing antibodies protect against hepatitis C virus quasispecies challenge. *Nat Med* 14:25–27.
- Li C, et al (2020). Impact of maternal HIV-HBV coinfection on pregnancy outcomes in an underdeveloped rural area of southwest China. *Sex Transm Infect.* 2020 Nov;96(7):509-515.
- Li C, et al (2020). Impact of maternal HIV-HBV coinfection on pregnancy outcomes in an underdeveloped rural area of southwest China. *Sex Transm Infect.* 2020 Nov;96(7):509-515.
- Li, M. et al (2020). Hepatitis E virus infection and its associated adverse fetomaternal outcomes among pregnant women in Qinhuangdao, China. *J. Matern. Fetal Neonatal. Med.* 33, 3647–3651 (2020).
- Li, P. et al (2020). The global epidemiology of hepatitis E virus infection: a systematic review and meta-analysis. *Liver Int.* 40, 1516–1528 (2020).
- M. Amougou-Atsama, P. Jean Adrien Atangana, D. Noah Noah, P. Fewou Moundipa, P. Pineau, R. Njouom (2020). The role of hepatitis C virus genotypes and core mutations in hepatocellular carcinoma in Cameroon.
- Ma, X. et al (2018). Chronic hepatitis B virus infection and preterm labor (birth) in pregnant women—an updated systematic review and meta-analysis. *J. Med. Virol.* 90, 93–100 (2018).
- N.H.M. Hamadou, et al (2025). Traitement de l' Hépatite C de Génotype 1 par les antiviraux ; Action Directe au Cameroun : résultats préliminaires. *HEALTH SCIENCES AND DISEASE*.
- P.A. Tagnouokam-Ngoupo, M.N. Ngoufack, S. Kenmoe, S.F. Lissoc, M. Amougou-Atsama, R. Banai, et al (2019). Hepatitis C virus genotyping based on Core and NS5B regions in Cameroonian patients.
- P.A. Tagnouokam-Ngoupo, et al. (2019). Hepatitis C virus genotyping based on Core and NS5B regions in Cameroonian patients.
- Quaranta M.G., et al (2024). Reduction of the risk of hepatocellular carcinoma over time using direct-acting antivirals: a propensity score analysis of a

- real-life cohort (PITER HCV) *Viruses*. 2024;16(5):682. doi: 10.3390/v16050682. 26 avr.
- R. Njouom, et al (2003). Hepatitis C virus infection among pregnant women in Yaoundé, Cameroon: prevalence, viremia, and genotypes.
- R. Njouom, et al (2012). Phylogeography, risk factors and genetic history of hepatitis C virus in Gabon, central Africa
- R.D. Trimbilas, et al (2016). Molecular characterization of hepatitis C virus core region in Moroccan intravenous drug user
- Ragusa R, Giorgianni G, Lupo L et al (2018). Healthcare-associated *Clostridium difficile* infection: role of correct hand hygiene in cross-infection control.
- Revill, P. A. et al (2020). The evolution and clinical impact of hepatitis B virus genome diversity. *Nat. Rev. Gastroenterol. Hepatol.* 17, 618–634 (2020).
- Schillie S, et al (2020). CDC Recommendations for hepatitis C screening among adults—United States, 2020.
- Schillie S, et al (2020). CDC Recommendations for hepatitis C screening among adults—United States, 2020.
- Shimakawa, Y. et al (2019). Hepatitis B core-related antigen (HBcrAg): an alternative to HBV DNA to assess treatment eligibility in Africa. *Clin. Infect. Dis.* 70, 1442–1452 (2019).
- Wang F, et al (2017). Post-vaccination serologic testing of infants born to hepatitis B surface antigen positive mothers in 4 provinces of China. *Vaccine*. 2017;35(33):4229–35.
- Wang W, et al (2020). Dual-targeting nanoparticle vaccine elicits a therapeutic antibody response against chronic hepatitis B. *Nat Nanotechnology*. 2020; 15:406–16
- Wong, et al (2023). Real-world treatment outcome with protease inhibitor direct-acting antiviral in advanced hepatitis C cirrhosis: a REAL-C study *Hepatol Int.* 2023/
- World Health Organization (2016). global health sector strategy on viral hepatitis 2016–2021: towards ending viral hepatitis. Geneva: World Health Organization; 2016 (<http://apps.who.int/iris/bitstream/10665/246177/1/WHO-HIV-2016.06-eng.pdf?ua=1>, accessed 2 April 2020).
- World Health Organization (2017). Elimination of mother to child transmission of HIV and syphilis. Geneva.
- Zou H et al (2012) Virologic factors associated with failure to passive-active immunoprophylaxis in infants born to HBsAg-positive mothers. *J Viral Hepat.* 2012 Feb;19(2): e18-25

#### CONFLICTS OF INTEREST

The authors declare no conflict of interest in relation to this work.

#### HOW TO CITE

*Tatiana Jiengoué, Olivier Lieuga and Augustine Nji Asakizi (2026). Identifying pregnancy risks complications due to maternal-fetal HBV and HCV at the Bertoua Regional Hospital in the East Region of Cameroon. IQ Research Journal, 5(2), IQRJ-V05102-26005009. [www.iqresearchjournal.com](http://www.iqresearchjournal.com)*

## ANNEXES

**Annex I — Table 1: Socio-demographic information and prevalence rates among pregnant women attending ANC**

Variables					
Age	(19-28)	(29-38)	(39-48)	(49-58)	-
n	248	82	62	8	-
%	62%	20.5%	15.5%	2%	-
Marital status	Single	Married	Divorced	Widow	-
n	238	112	33	17	-
%	59.5%	28%	8.25%	4.25%	-
Education level	No formal education	Primary school	Secondary school	College	Postgraduate
n	130	122	84	49	15
%	32.5%	30.5%	21%	12.25%	3.75%
Occupation	Housewife	Business	Framing	Government employed	-
n	155	135	68	42	-
%	38.75%	33.75%	17%	19.5%	-
Religion	Christian	Muslim	-	-	-
n	358	42	0	0	-
%	89.5%	10.5%	0%	0%	-
Gravidity and parity	First pregnancy	More than one pregnancy	-	-	-
n	95	305	-	-	-
%	23.75%	76.25%	-	-	-

**Annex II — Table 2: HBV/HCV positive mothers experienced pregnancy risk complications percentage**

Hepatitis B and C pregnancy risk complications	Preterm birth	Low birth weight	Congenital abnormalities	NICU
Yes	23	25	19	20
n				
%	79.31%	86.20%	65.51%	68.76%
No				
n	6	4	10	9
%	20.69%	13.79%	34.49%	31.24%