

Opponent's report on Abanoub Riad's habilitation thesis "**COVID – 19 Vaccine Hesitancy: A Tale of Two Pandemics**"

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The habilitation thesis deals with two ongoing pandemics, the COVID-19 pandemic and the pandemic of refusal to vaccinate against this disease. These two pandemics affect each other and complicate each other.

The main objectives included:

- to measure the prevalence of COVID-19 vaccine hesitancy among target population groups in the Czech Republic and around the world during primary vaccination campaigns (winter-summer 2021) and booster vaccination (winter-spring 2022)
- to explore demographic and anamnestic risk factors for COVID-19 vaccine hesitancy among population targets during primary and booster vaccination campaigns
- to explore the psychological correlates of COVID-19 hesitancy among population target groups during primary and booster vaccination.

Secondary objectives included:

- to explore the systemic determinants of COVID-19 vaccine hesitancy in the context of many countries
- to develop a validated psychometric tool for assessing COVID-19 To compare the psychological correlates of COVID-19 VBH between the Czech, German, Polish and Algerian populations.

COVID-19 surveillance began in Europe in January 2020, with the first major outbreak possibly coming from Italy; as of July 2023, Europe accounts for 32.43% (248.96 million) of the 767.73 million confirmed cases worldwide. As of July 2023, COVID-19 trends in EU/EEA countries have stabilized or declined, with 75.6% of the population receiving at least one dose of the vaccine and no increase in cases, hospitalizations or deaths projected until mid-July.

From the first cases in March 2020 to July 11, 2023, the Czech Republic reported 4,642,836 confirmed cases of COVID-19 and 42,811 deaths, with significantly higher vulnerability among men and individuals aged 60 and over.

As of July 2023, the country has administered 18,625,801 doses of the vaccine, with a significant daily output impacted by logistical restrictions, public holidays, and booster vaccination rollouts.

Between December 2019 and May 2022, the EU and ECDC put in place comprehensive, evolving strategies to combat the COVID-19 pandemic, informing the Czech government's own wide-ranging measures, including the state of emergency, restrictions on movement and retail operations.

Hesitation with the COVID-19 vaccine in the Czech Republic

This section presents three studies conducted among different groups of the Czech population in spring 2021 (study II), summer 2021 (study III) and autumn 2021 (study IV). Studies II and III aimed to investigate vaccine hesitancy during the primary vaccination campaign among college students and pregnant or breastfeeding women. Conversely, Study IV was designed to investigate vaccine hesitancy during booster campaigns specifically targeting health care workers.

College students, often seen as prospective opinion leaders with increased levels of health literacy, embodied a vital demographic in the fight against COVID 19. Their attitudes towards vaccination could significantly shape broader societal trends, making them understand the factors that drive vaccine hesitancy.

The primary objective of this study was to estimate the prevalence of COVID-19 vaccine hesitancy among Czech university students.

While the secondary objective was to identify demographic risk factors and causes of vaccine hesitancy in this population. Of the 1351 students included in the final analysis, 73.3% received the COVID-19 vaccine, 19.3% demonstrated vaccine resistance, and 7.4% showed vaccine hesitancy. A temporal analysis of attitudes towards the COVID-19 vaccine showed an increase in vaccine resistance from 18.7% in the first week to 29.5% by the fifth week. There was no significant difference in acceptance levels between men and women, but women (8.3%) compared to men (5.2%) experienced slightly increased vaccine hesitancy. Students in law, engineering, business and economics, social sciences, and natural sciences reported relatively high vaccine acceptance, while students in military sciences, agriculture, forestry, veterinary sciences, and education and social care showed greater vaccine hesitancy.

Factors that predicted a higher likelihood of receiving the vaccine included trust in the pharmaceutical industry, trust in healthcare providers, and perceived sufficient knowledge. Conversely, factors that predicted a higher likelihood of vaccine hesitancy included media and social media influence, personal beliefs, misconceptions about immunity, previous COVID-19 infection, and suspicion of new vaccines and their local availability.

The COVID-19 pandemic has had significant non-health impacts across Europe and the Czech Republic, disrupting economies, widening social and educational disparities, and increasing unemployment, stress and mental health; The EU has undertaken a number of economic recovery initiatives, but concerns remain about persistent structural problems and potential slow growth.

The habilitation thesis assesses the hesitancy of administering a COVID-19 vaccine in seven studies in the Czech Republic and abroad with a total number of participants of almost 14,000. This is a fact that I evaluate very positively, because the validity of the results achieved increases significantly. Furthermore, such a large sample of the subjects allows for the generalization of the results to a certain extent. Also, the methods used in the examination of study participants are a guarantee of the validity of the results achieved. In addition to generalizability, timing during critical phases of impulse/booster rollout offers early evidence on how to navigate the pandemic response. The use of proven tools and advanced statistical

techniques increases analytical accuracy. And the diverse populations surveyed facilitate global comparisons of vaccine attitudes and related socio-demographic factors.

The study found that women, younger adults, and those who did not trust the evidence on the safety/efficacy of the vaccine were more hesitant to administer the COVID-19 vaccine. Altruism and collective responsibility have proven to be significant motivators for adoption. Overall, multi-level strategies to promote vaccine adoption increase the chances of vaccine adoption.

This work is also important because public health is still struggling with infectious diseases and vaccine hesitancy worldwide.

I consider the habilitation thesis of Abanoub Riad, PhD, DDS, FRSPH as successful. Its topic is clearly topical and has brought new, concrete scientific knowledge. The processing methodology was chosen correctly. The work has brought new insights into the hesitancy to administer a COVID 19 vaccine. Given that the problem is global, it has a significant social and professional impact.

In my opinion, the habilitation thesis meets the conditions set out in Section 72(1) of the Act. 3, Act No. 111/1998 Coll., on Higher Education Institutions and on the Modification and Amendment of Other Acts. I recommend that it be accepted as a basis for the habilitation procedure and, on the basis of a successful procedure, the applicant be awarded the title of Associate Professor in the field of Hygiene, Preventive Medicine and Epidemiology.

Olomouc 5.3.2024

prof. Vladimír Janout, MD, Ph.D.