### Analysis Plan for COVID-19 Vaccine Hesitancy Study in Barbados

#### 1. Study Objectives

The primary objective of this analysis was to investigate factors associated with COVID-19 vaccine hesitancy among participants in Barbados. Specifically, the analysis aimed to:

1. Describe sociodemographic characteristics of vaccine-hesitant and non-hesitant individuals.
2. Examine sources of information, trust in those sources, knowledge about COVID-19, and attitudes toward the vaccine in relation to hesitancy.
3. Assess associations between vaccine hesitancy and key predictors (e.g., sociodemographics, media sources, trust, knowledge, and attitudes) using bivariate and multivariate models.
4. Identify knowledge, attitudes, and practices (KAP) predictors of vaccine hesitancy, adjusted for sociodemographic confounders.

This analysis may be able to inform public health strategies to address vaccine hesitancy by highlighting modifiable factors such as information sources and attitudes.

#### 2. Data Source

* **Dataset**: The data will be imported from an SPSS file ("COVID-19 and a New Vaccine.sav") containing survey responses on COVID-19 knowledge, attitudes, practices, and vaccine hesitancy.
* **Sample**: Adults in Barbados who completed the survey. Observations with missing hesitancy data were excluded.
* **Key Assumptions**: Data are cross-sectional; no longitudinal follow-up. Missing values will be handled by listwise deletion in analyses where applicable. The analysis assumes the survey is representative of the target population, though no weighting is applied.

#### 3. Data Preparation and Variable Creation

* **Data Cleaning**:
  + Convert age (q0002) from text to numeric by replacing descriptive strings (e.g., "30 years old" to "30").
  + Recode education (q0005) based on "other" responses (e.g., "Associate Degree" to less than tertiary).
  + Destring variables as needed for analysis.
* **Derived Variables**:
  + **Sociodemographics**:
    - age\_cat: Binary (1: <40 years; 2: ≥40 years).
    - educ\_cat: Tertiary (1: Less than tertiary; 2: Undergraduate; 3: Graduate).
    - religion: Binary (from q0006: 0: No; 1: Yes).
    - income: Binary (1: <$50,000; 2: ≥$50,000).
    - marital: Categorical (1: Single; 2: Cohabiting; 3: Married; 4: Widowed/Divorced/Separated).
    - living: Categorical (1: Alone; 2: With spouse; 3: Nuclear family; 4: Extended; 5: Blended).
    - employ: Categorical (1: Unemployed; 2: Employed; 3: Retired).
    - gender: Binary (from q0003: 1: Male; 2: Female).
  + **Vaccine Hesitancy**:
    - hes: Sum of hesitancy reasons (q0027\_0001 to q0027\_0013, q0027\_0015).
    - hesistant: Binary (0: Non-hesitant if q0027\_0014=1; 1: Hesitant if hes ≥1).
  + **Media Sources**:
    - Dummy variables (media\_1 to media\_7) generated from q0012 (e.g., newspaper, TV, radio, word of mouth, social media).
  + **Trust in Information**:
    - Recode q0013\_0001 to q0013\_0010 (1-5 scale to binary: 0: Distrust/Unsure [1-3]; 1: Trust [4-5]).
  + **Knowledge**:
    - Individual knowledge items (kno\_001 to kno\_009): Binary correct/incorrect based on questions q0014 to q0022 (e.g., symptoms, transmission, prevention).
    - kno\_score: Sum of correct responses, scaled to percentage (0-100).
    - kno\_cat: Binary (0: Not knowledgeable [<75%]; 1: Knowledgeable [≥75%]).
  + **Attitudes**:
    - Recode q0028\_0001 to q0028\_0008 (1-5 scale to binary: 0: Disagree/Unsure [1-3]; 1: Agree [4-5]).
    - attitude\_score: Sum of attitude items (range: 0-8).
    - attitude\_cat: Tertiles (1: Low; 2: Medium; 3: High).
* **Filtering**: Keep only observations with non-missing hesitancy (hesistant != .).

#### 4. Statistical Analyses

* **Software**: Stata (implied by do-file syntax).
* **Descriptive Statistics**:
  + Means and standard deviations (SD) for continuous variables (e.g., age, knowledge score, attitude score).
  + Frequencies and percentages for categorical variables.
  + Stratified by hesitancy status.
* **Bivariate Analyses**:
  + Chi-square tests for associations between categorical variables (e.g., sociodemographics, media, trust, attitudes) and hesitancy.
  + Independent t-tests for continuous variables (e.g., age, scores) by hesitancy.
  + Row percentages for hesitancy within predictor categories.
* **Multivariate Analyses**:
  + Logistic regression models for odds ratios (OR) of hesitancy:
    - **Bivariate Models**: Unadjusted ORs for each predictor (e.g., attitude score, media dummies, trust items, sociodemographics).
    - **Adjusted Models**: ORs adjusted for sociodemographics (gender, age\_cat, educ\_cat, income, employ). Restricted to gender ≤2 (male/female only).
    - Robust standard errors (vce(robust)) for all models.
    - Specific models for KAP: Knowledge score/cat, attitude score/cat as main predictors.
  + Output format: ORs with 95% confidence intervals (CI) and p-values, formatted to 2 decimal places.
* **Significance Level**: p < 0.05 for statistical significance (no multiple testing correction).
* **Handling Missing Data**: Listwise deletion; no imputation.
* **Sensitivity Analyses**: None specified, but tertile-based categorization for scores allows exploration of non-linear effects.

#### 5. Outputs and Reporting

* **Tables**:
  + **Table 1: Sociodemographics**: Frequencies/percentages by hesitancy, with chi-square p-values (or t-test for age mean/SD).
  + **Table 2: Source of Information**: Media sources and trust levels by hesitancy, with chi-square p-values.
  + **Table 3: Knowledge**: Correct responses (means/SD for items; overall score) by hesitancy, with t-test p-values.
  + **Table 4: Attitudes**: Agreement frequencies/percentages by hesitancy, with chi-square p-values; overall score with t-test.
  + **Table 5: KAP Predictors**: Adjusted ORs, 95% CI, p-values for knowledge and attitude scores/categories.

#### 6. Limitations and Considerations

* Cross-sectional design limits causality inference.
* Self-reported data may introduce bias (e.g., social desirability).
* Binary recoding of scales (trust, attitudes) may lose nuance.
* No adjustment for religion, marital, or living status in final models (focus on core confounders).
* Future extensions: Interaction terms (e.g., education × knowledge) or subgroup analyses (e.g., by gender).

COVID-19 Vaccine Hesitancy Study Analysis Results

**Table 1 - Sociodemographics of Participants**

| **Characteristic** | **Vaccine Hesitant** | **Non-Vaccine Hesitant** | **p-value** |
| --- | --- | --- | --- |
| **Gender** |  |  |  |
| Male | 67 (40.4%) | 99 (59.6%) | 0.056 |
| Female | 156 (37.2%) | 263 (62.8%) |  |
| **Age** |  |  |  |
| Mean (SD) | 38.3 (11.9) | 41.3 (13.6) | 0.007 |
| **Age group** |  |  |  |
| <40 | 139 (42.4%) | 189 (57.6%) | 0.036 |
| ≥40 | 90 (34.0%) | 175 (66.0%) |  |
| **Education** |  |  |  |
| Less than tertiary | 56 (35.7%) | 101 (64.3%) | 0.496 |
| Undergraduate degree | 119 (41.2%) | 170 (58.8%) |  |
| Graduate degree | 57 (37.7%) | 94 (62.3%) |  |
| **Religious affiliations** |  |  |  |
| No | 111 (39.9%) | 167 (60.1%) | 0.665 |
| Yes | 123 (38.2%) | 199 (61.8%) |  |
| **Household income** |  |  |  |
| <$50,000 | 81 (41.1%) | 116 (58.9%) | 0.501 |
| ≥$50,000 | 148 (38.2%) | 239 (61.8%) |  |
| **Marital status** |  |  |  |

**Table 2 - Source of information and vaccine hesitancy**

| **Characteristic** | **Vaccine Hesitant** | **Non-Vaccine Hesitant** | **p-value** |
| --- | --- | --- | --- |
| **Medium for access to information** |  |  |  |
| Newspaper | 21 (41.2%) | 30 (58.8%) | 0.751 |
| Television | 29 (33.7%) | 57 (66.3%) | 0.269 |
| Radio | 8 (40.0%) | 12 (60.0%) | 0.933 |
| Word of mouth | 19 (35.8%) | 34 (64.2%) | 0.611 |
| Social media | 4 (19.0%) | 17 (81.0%) | 0.055 |
| **Trust in information source** |  |  |  |
| Health professionals | 186 (34.7%) | 350 (65.3%) | 0.000 |
| Announcements or news conferences | 175 (33.7%) | 345 (66.3%) | 0.000 |
| Friends and family members | 153 (32.1%) | 324 (67.9%) | 0.000 |
| News websites or apps | 81 (35.8%) | 145 (64.2%) | 0.217 |
| Church leaders | 136 (36.7%) | 235 (63.3%) | 0.113 |
| Employer | 34 (37.8%) | 56 (62.2%) | 0.825 |
| Social media | 74 (31.8%) | 159 (68.2%) | 0.002 |
| Radio | 64 (43.0%) | 85 (57.0%) | 0.254 |
| Television | 121 (34.3%) | 232 (65.7%) | 0.005 |
| Other | 123 (34.1%) | 238 (65.9%) | 0.002 |
|  |  |  |  |
|  |  |  |  |

**Table 3 - Participants correct knowledge of the COVID-19 virus**

| **Knowledge characteristic** | **Vaccine Hesitant** | **Non-Vaccine Hesitant** | **p-value** |
| --- | --- | --- | --- |
| Possible for COVID-19 patient to show symptoms | 0.974 (0.158) | 0.973 (0.163) | 0.894 |
| Time taken to show symptoms of COVID-19 after disease infection | 0.714 (0.453) | 0.660 (0.474) | 0.172 |
| Persons who can get infected with COVID-19 | 0.991 (0.092) | 0.997 (0.052) | 0.325 |
| Common symptoms of COVID-19 | 5.549 (2.019) | 5.655 (1.815) | 0.504 |
| COVID-19 virus spread | 0.991 (0.092) | 0.997 (0.052) | 0.325 |
| Length of time for hand washing | 0.660 (0.475) | 0.716 (0.452) | 0.145 |
| Protective measures to COVID-19 infection | 0.983 (0.130) | 0.995 (0.074) | 0.163 |
| Personnel wearing face masks | 0.902 (0.298) | 0.951 (0.216) | 0.020 |
| Distance for social distancing | 0.770 (0.422) | 0.812 (0.391) | 0.209 |
| **Overall knowledge score** | 73.7 (14.4) | 75.0 (12.1) | 0.257 |
|  |  |  |  |

**Table 4 - Participants attitude toward COVID-19 vaccine**

| **Attitude Characteristic** | **Vaccine Hesitant** | **Non-Vaccine Hesitant** | **p-value** |
| --- | --- | --- | --- |
| It is important to get a vaccine to protect people from COVID-19 | 26 (92.9%) | 2 (7.1%) | 0.000 |
| COVID-19 vaccines made in Europe or America are safer than those made in other countries | 49 (38.6%) | 78 (61.4%) | 0.223 |
| The fear of side effects prevent me from getting the AstraZeneca vaccine | 37 (38.1%) | 60 (61.9%) | 0.000 |
| Access to the AstraZeneca vaccine is preventing me from getting it | 29 (38.2%) | 47 (61.8%) | 0.002 |
| I am concerned about the safety of the AstraZeneca vaccination | 30 (25.6%) | 87 (74.4%) | 0.000 |
| I worry about the long term side effects of the AstraZeneca vaccine | 22 (21.0%) | 83 (79.0%) | 0.000 |
| I will only take the AstraZeneca vaccine if it is taken by many in the Barbadian public | 50 (47.2%) | 56 (52.8%) | 0.000 |
| Vaccination decreases my chance of getting COVID-19 or its complications | 17 (65.4%) | 9 (34.6%) | 0.000 |
| **Overall attitude score** | 23.3 (5.2) | 19.4 (3.9) | 0.000 |

**Table 5 - KAP Predictors of COVID-19 vaccine hesitancy among participants**

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| **Knowledge score** | 0.99 | 0.98-1.00 | 0.149 |
| **Knowledge categories** |  |  |  |
| Not knowledgeable | Ref | - | - |
| Knowledgeable | 0.84 | 0.60-1.19 | 0.328 |
| **Attitude score** | 1.21 | 1.15-1.26 | 0.000 |
| **Attitude categories** |  |  |  |
| Neutral Attitude | Ref | - | - |
| Negative Attitude | 2.26 | 1.42-3.61 | 0.001 |
| Positive Attitude | 9.10 | 5.51-15.04 | 0.000 |

*Note: Models adjusted for Sociodemographic characteristics*

*Sample sizes: Vaccine Hesitant n=235, Non-Vaccine Hesitant n=368*