

**COVID-19**

**Vaccine Promotion Lottery Draw:**

**a pilot program among the population of Yerevan, Armenia**

Master of Public Health Integrating Experience Project

Community Service Grant Proposal

BY

**Joan Alexandra Mathew MD, MPH (c)**

Advising team:

**Varduhi Petrosyan, MS, PhD**

**Tsovinar Harutyunyan, MPH, PhD**

**Turpanjian College of Health Sciences**

**American University of Armenia**

**Yerevan, Armenia**

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## TABLE OF CONTENT

<b>LIST OF ABBREVIATIONS</b>	2
<b>EXECUTIVE SUMMARY</b>	4
<b>1. AIM AND OBJECTIVE OF THE PROGRAM</b>	5
<b>2. INTRODUCTION</b>	5
a. Situational analysis	5
b. Situation in Armenia	9
c. Strategy Appraisal	11
d. Recommendation for a course of action	16
<b>3. METHODOLOGY</b>	18
a. Conceptual framework	18
b. Implementation plan	19
c. Evaluation plan	23
<b>4. BUDGETING</b>	26
<b>5. ETHICAL CONSIDERATIONS</b>	27
a. Community acceptance of the program	27
b. Ethical considerations	27
c. Integration of proposed program with existing community resources	28
d. Sustainability beyond the funding period.	28
<b>6. REFERENCES</b>	29
<b>7. APPENDIXES</b>	39
Appendix 1: Timeline	39
Appendix 2: Budget estimate for the proposal	41
Appendix 4: Participant questionnaire	45

## **LIST OF ABBREVIATIONS**

ARMED	-	National digital health system used in Armenia
BE	-	Behavioral Economics
COVID-19	-	Coronavirus disease of 2019
FI	-	Financial Incentive
G7	-	Group of Seven countries consisting of the United States, Canada, Germany, France, Italy, the United Kingdom, and Japan
GDP	-	Gross Domestic Product
ICU	-	Intensive Care Unit
IRI	-	International Republican Institute
SARS-CoV-2	-	Severe acute respiratory syndrome coronavirus 2
US	-	United States of America
VOC	-	Variant of Concern
WHO	-	World Health Organization

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## **EXECUTIVE SUMMARY**

The coronavirus pandemic began in December 2019 in Wuhan, China, and continues to be globally rampant in 2022, with the infection and death of millions. Maneuvers attempting to contain the pandemic were and are still in effect along with vaccine development to provide immunity against the virus, reducing the likelihood of COVID-19 contraction or decreasing the severity of disease if infected. By November 21, 2021, the global vaccination rate successfully surpassed the goal set by COVAX; the World Health Organization's Initiative to inoculate 20% of the global population by 2021, resulting in 50% of fully vaccinated individuals. Vaccination numbers must continue to rise as the emergence of variants more transmissible than the original strain is concerning due to its increased severity of infection.

In March 2020, Armenia saw the first case of COVID-19, and the country experienced a war amid the pandemic; thousands of lives were lost to both. As the political climate settled in Armenia, the Government focused on containing the pandemic, announcing its vaccination goal to immunize 20% of the total population within a year. Armenia achieved this goal and as of May 1, 2022, 2.15 million doses have been administered, enough to have vaccinated 38% of the total population and have fully vaccinated about 33% of the total population. In order to break the high transmissibility chain, vaccination numbers must continue to increase. Armenia's government and many organizations continue the awareness raising campaign on COVID-19 precautionary measures, including vaccination, through their websites and social media in video, poster, and TV advertisement. Alongside the educational efforts, there is a mandate placed by the Government on employers to ensure their workers are either vaccinated or frequently PCR tested for COVID-19. The above strategy can be complemented by offering financial incentives to individuals to get vaccinated.

This program proposes a vaccine promotion in the form of a lottery draw where five citizens of Armenia, aged 18 and older, receiving their first dose of the COVID-19 vaccine in the capital city of Yerevan, during a forty-two-day countdown period of the proposed program, a chance at winning one million Armenian drams each. The timeline for the proposed program is a hundred days. The objective of the proposed program is to increase the administration of the first dose of COVID-19 vaccination in a forty-two-day period by 1.5% from the number of the first doses administered forty-two days prior to the countdown period of the program among citizens of Yerevan, Armenia. The budget of the proposed program is 40 749 USD (18.47 million Armenian Drams). Descriptive statistics will be used for analysis. An evaluation will be conducted at the end of the proposed program which will measure the results against the set goal and, if successful, may be used in marzes behind in administering COVID-19 vaccines or in the risk groups to promote higher rate of vaccination.

## **1. AIM AND OBJECTIVE OF THE PROGRAM**

### Aim of the program:

The aim of the proposed program is to increase the number of first doses of COVID-19 vaccinations in Yerevan, Armenia, among its citizens 18 and older through a vaccine promotion program in the form of a lottery draw.

### The objective of the program:

By the end of the forty-two-day count down period of the COVID-19 vaccine promotion program in the form of a lottery draw, the number of the first doses administered among Armenian citizens aged 18 and above, residing in Yerevan, Armenia, will increase by 1.5% against the number of the first doses administered before the forty-two-day count down period of the program.

The effectiveness of the program delivered in Yerevan, Armenia, will be evaluated against the program's goal. This strategy, if proved effective, may be used as a reference for the marzes that are behind in administering COVID-19 vaccines.

## **2. INTRODUCTION**

### **a. Situational analysis**

The coronavirus disease also known as COVID-19, is a communicable illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which results in mild to moderate respiratory ailment among the majority of people and serious sickness among the remaining minority of around 5% of infected people.<sup>1</sup> The groups most vulnerable to COVID-19

are those who have underlying medical conditions and older population.<sup>1</sup> The mode of SARS-CoV-2 transmission is through breathing respiratory droplets dispersed from an infected person's mouth or nose when they cough, speak, or the like.<sup>1</sup>

The coronavirus pandemic affected the world, leading to the disease and death of millions, adversely impacting multiple industries in its wake and projecting the decrease of the Gross Domestic Product (GDP) of countries worldwide.<sup>2,3</sup> The first case of the coronavirus was discovered in Wuhan, China, on December 31, 2019.<sup>4</sup> From there, the infection spread, setting off a domino effect, and cases began to emerge in different countries.<sup>5</sup> As of May 1, 2022, the total number of coronavirus cases is more than 513 million, and there are more than 6.26 million total deaths from it worldwide.<sup>2</sup>

Strategies such as social distancing, hand washing, mask-wearing, self-isolation, and quarantine were and are still deployed to control the pandemic.<sup>6</sup> Vaccines were developed at a rate faster than ever before as a superior measure of providing immunity to the population to prevent the rise in new cases and stop the pandemic.<sup>7</sup> The plan of action recommended by the World Health Organization (WHO) to control this pandemic is through herd immunity which is achieved through vaccinating against SARS-CoV-2.<sup>8</sup> Herd immunity is the protection of a population from an infectious agent either through immunity from a previous infection of the same agent or immunity acquired through vaccine administration against the agent itself.<sup>8</sup> The WHO states that at least 60% to 70% of the population needs immunity against the virus to break the high transmissibility chain.<sup>9</sup> To provide equitable access to vaccines for all countries worldwide, WHO started an initiative called COVAX.<sup>10</sup> The goal set by COVAX was to vaccinate 20% of the global population by the end of 2021.<sup>11</sup> WHO also appealed to Canada, United States of America, Germany, France, Italy, United Kingdom, and Japan's leaders, i.e., the Group Seven

(G7), to vaccinate 70% of the world's population by mid to end of 2022.<sup>12</sup> To date, more than a dozen vaccines have been developed globally.<sup>13</sup> As of May 1, 2022, at least 199 countries are involved in vaccinating their citizens, and more than 11.46 billion vaccine doses have been administered, enough to vaccinate 67% of the global population and fully vaccinate 61% of them.<sup>14,15</sup> These numbers fulfill the initial goal set by COVAX but the need to vaccinate more people has never been this urgent as variants of concern are continuously emerging; mutations occur due to the high number of unvaccinated individuals allowing for the virus to infect, replicate and ultimately mutate in them.<sup>11,16</sup>

The Variants of Concern (VOC) designated by WHO are Alpha, Beta, Gamma, Delta, and Omicron.<sup>17</sup> The VOC label is characterized by its high transmissibility, increased virulence, and reduced susceptibility to public health measures.<sup>17</sup> The transmissibility of the Alpha variant is 50 to 60% more than the original strain of SARS-CoV-2.<sup>18</sup> The Delta variant which emerged after was identified in being 50% to 60% more transmissible than the Alpha variant and it spread rapidly becoming the dominant variant to cause COVID-19 in many countries.<sup>19,18,20</sup> The Delta strain is said to be the “fastest and fittest” of all strains of the SARS-CoV-2 virus due to its ability to evade the body’s immune system through quick replication cycles.<sup>21</sup> In two separate studies done in Scotland and Canada, it was found that there was an increased likelihood for the Delta variant to cause hospitalizations.<sup>22</sup> The Omicron variant came about after the Delta variant with an increased risk of reinfection, but as Omicron is a new variant, more clinical studies will be required for further evidence regarding the strain.<sup>23,24</sup> Current data shows that the Omicron variant causes disease with less severity than the Delta variant though it causes more infections than Delta.<sup>25</sup> Although the Omicron variant is said to cause disease with less severity among the majority of the population, it still causes severe disease, hospitalizations and death among the



risk groups, particularly those not vaccinated.<sup>26</sup> Therefore, the best protection against COVID-19, severity of disease and its variants is through vaccines, booster shots and additional doses as required.<sup>27</sup>

Analysis demonstrates nearly all COVID-19 deaths in the US were among the unvaccinated and vaccinations have been effective in decreasing COVID-19 related hospitalizations.<sup>28-30</sup> A November 2021 report published by the Washington State Department of Health showed a five-fold increase in contracting COVID-19 among the unvaccinated as compared to those who were fully vaccinated among three age groups 12-34 year-olds, 35-64 year-olds, and 65+ year-olds.<sup>31</sup> The same report showed that the increase in hospitalizations with COVID-19 was nine-fold, fourteen-fold, and eighteen-fold higher among the unvaccinated as compared to those fully vaccinated in the 65+-year-old, 12-34-year-old, and 35-64-year-old age categories, respectively.<sup>31</sup> In multiple clinical studies conducted around the world, similar data have been reported of COVID-19 vaccine effectiveness in preventing hospitalizations and deaths from the coronavirus disease in both healthy population and high-risk groups with some vaccines providing reasonable effectiveness against the new variant Omicron with protection against the severity of the disease.<sup>32-37</sup> Although the current COVID-19 vaccine protects its recipient from infection and severity of disease, its strength wanes as months go by and this is where booster shots come in place as they extend protection against the Delta or Omicron variants.<sup>38</sup> Studies show that while two doses of mRNA vaccine provide 35% protection against the COVID-19 infection, the vaccine booster restores 75% effectiveness.<sup>39</sup>

## **b. Situation in Armenia**

Armenia is situated between Europe and Asia, with 2.97 million people and GDP per Capita at 4,199 US dollars.<sup>40,41</sup> In March of 2020, Armenia saw the first case of the coronavirus.<sup>42</sup> After its detection, a state of emergency was declared until August 2020. During this period, governmental agencies published COVID-19 hotline numbers on their websites for citizens and residents with COVID-19 symptoms or related inquiries.<sup>43</sup> While Armenia was facing its share of the pandemic, Azerbaijan started a war, and it complicated the situation even more.<sup>44</sup> Lives were lost in thousands to the war and the pandemic, with high numbers of COVID-19 cases seen during November 2020 because of the war.<sup>45,46</sup> By December 2020, the sharp increase in daily cases began to decline as the active war ended and the Government redirected its focus on containing the pandemic.<sup>46</sup>

By the March 2021, Armenia received their first batch of COVID-19 vaccines, which was initially made available for high-risk groups and vaccine hesitancy was observed.<sup>47</sup> A nationwide survey conducted in Armenia between April and May of 2021 by the International Republican Institute's (IRI) Center for Insights in Survey Research among permanent Armenian residents, 18 and older, showed that 71% of Armenians were not willing to take vaccination against COVID-19 if it were available.<sup>48,49</sup> The main reasons for refusal were concerns regarding side effects (37%), not considering the vaccine a necessity (25%), wanting to know more on how well the vaccines work (15%), not taking vaccines in general (13%), unavailability of the preferred choice of the vaccine (3%), rest (7%) refused to answer or found it difficult to answer.<sup>49</sup> In the second IRI survey done in July 2021 more favorable results towards getting vaccinated were found, where 43% of respondents said definitely yes (14%) and probably yes (29%) to the question "Vaccines against COVID-19 are now available: will you get

vaccinated?”.<sup>50</sup> Among those respondents who did not answer definitely yes and probably yes, the reasons were concerns about side effects (35%), thinking they do not need it (16%), wanting to know more on how well they work (15%), concerns that vaccines do not protect them (10%), not knowing the duration of COVID-19 vaccine immunity (9%), not taking vaccines in general (7%), already had been infected with COVID-19 (5%), vaccine of choice not available (1%), other (<1%), don't know/refuse to answer (2%).<sup>50</sup>

Travel restrictions into the country consisted of either a negative test result on the PCR test done within 72 hours of travel or having a certificate of complete vaccination of two doses where the second dose was taken at least 14 days before the entry to the country.<sup>51</sup> There was no travel ban from higher burden countries, possibly to stimulate the declining economy, but it may have caused travelers to bring about variant strains of the coronavirus more transmissible, severe, and harder to treat than the original strain.<sup>52</sup> The first cases of the Delta variant in Armenia were reported in early August 2021, with 25 Delta variants out of 30 tested samples collected in the spring and early summer months.<sup>53</sup> The first two cases of Omicron in Armenia were detected in January 10, 2022, with more reported the following days of the same month.<sup>54</sup>

Daily cases that were in hundreds in July 2021 substantially increased to thousands as of October 2021, along with daily deaths from tens in July 2021 to fifties as of October 2021, bringing about the fourth wave of the COVID-19 pandemic.<sup>46</sup> As of May 7, 2022, the total number of COVID-19 cases is more than 422 thousand, and the total deaths from it are more than 8622 in Armenia.<sup>46</sup> For this same period, the 7-day moving average of daily cases for COVID-19 is at 2745 and daily deaths at 4 and by the looks of it, a fifth wave came down.<sup>46</sup> As of May 1, 2022 the 7-day moving average of daily cases for COVID-19 is at 6 and daily deaths at 0.<sup>46</sup> Armenia has administered 2.15 million vaccine doses against the SARS-CoV-2 virus, enough to have

vaccinated 38% of the total population and have fully vaccinated about 33% of the total population with 41 090 additional doses administered as of May 1, 2022.<sup>15</sup> An additional dose can mean one that is given to those with a compromised immune system to better their response to the previous doses of vaccination or a booster shot that is given after the immunity against COVID has decreased over time after the original shot.<sup>55</sup> It is imperative to increase immunization necessary to secure the health status of Armenian citizens, preventing further morbidity and mortality.<sup>46</sup> By avoiding the rise in new cases, the country can focus on rebuilding the nation and its economy affected by the war and the COVID-19 pandemic.<sup>56</sup>

### **c. Strategy Appraisal**

There are ongoing vaccine promotion educational campaigns run by leading health organizations, governments, and other supporting establishments around the world that educate citizens on the importance of taking COVID-19 vaccines.<sup>57-60</sup> In the US, one of the main vaccine education campaign is the COVID Collaborative which is the most extensive public health education campaign in history run to reach the American public with the most accurate information on vaccines.<sup>57</sup> The 199 countries that vaccinate against COVID-19 have deployed various strategies to increase vaccination rates.<sup>61</sup>

The first noteworthy mention is Israel, an early COVID-19 vaccine adopter that started its vaccination journey as early as December 20, 2020, and by February 2021, they vaccinated 40% of the total population and fully vaccinated 28% of the total population.<sup>62</sup> To date, Israel has vaccinated 74% of its total population and fully vaccinated 68% of its total population.<sup>15</sup> Israel gained access to large quantities of vaccines by paying more for the vaccines than other countries and negotiated a contract with the vaccine manufacturers to provide data on a weekly basis on

infection rates, sociodemographic characteristics of the vaccine recipient along with updated vaccination numbers and in return the vaccine manufacturers agreed to supply vaccinations to Israel until 95% of the total population is immunized.<sup>62</sup>

Georgia, Armenia's neighbor with a slightly higher population but similar GDP per capita is modestly ahead of Armenia in its vaccination journey, having about 43% of its total population vaccinated and 34% of its total population fully vaccinated.<sup>63,64</sup>

European Union's vaccine strategy is the use of regular testing for the unvaccinated or the EU Digital COVID Certificate also known as the vaccine pass, which can be obtained if one has been vaccinated, tested negative for COVID-19, or have recently recovered from a COVID-19 infection.<sup>65</sup> In terms of testing negative for the pass, the test results are valid for 72 hours for PCR tests and 48 hours for rapid antigen tests.<sup>65</sup> The pass may also be obtained by those who have recovered from a COVID-19 infection by the submission of a recent recovery certificate.<sup>65</sup> This token allows unrestricted movement across all EU countries but varies in some functions from country to country.<sup>65,66</sup> For instance, in France, it is needed for recreational activities and entry to restaurants.<sup>66</sup> France also has a mandate on all health workers to be vaccinated.<sup>66</sup> After the decision on the digital pass and mandate were announced, the overall vaccination rate of 40% jumped to 69% and is currently at 81% of its total population vaccinated and at 78% of its total population fully vaccinated.<sup>66,15</sup> In Italy, the pass was required for similar activities, and it was taken one step further by mandating vaccination for both private and public sector workers.<sup>66</sup> Italy to date has administered doses to have 84% of the total population vaccinated and have 79% of its total population fully vaccinated.<sup>15</sup> Slovenia's strategy was to mandate vaccination for all government employees, and their current immunization is at 61% for its entire population and 58% for its entire population fully vaccinated.<sup>66</sup> Germany gave free COVID-19 testing to the

public for entry into restaurants and other restricted areas, which they have taken away for all, reserving the free testing for a few in-need groups in hopes that the majority will opt to be vaccinated and the country has administered doses to have 78% of the total population vaccinated and 77% of the total population fully vaccinated.<sup>67,15</sup>

A more extreme strategy taken by Austria was mandating COVID-19 vaccinations for the entire adult population as the fourth wave hit Europe, introducing a lockdown for the unvaccinated.<sup>68</sup> To date, Austria has administered doses to have 77% of the total population vaccinated and have 74% of its total population fully vaccinated.<sup>15</sup>

The United States has inoculated 78% of the total population and fully vaccinated about 66% of its total population.<sup>15</sup> They had initially deployed strategies that reward getting vaccinated and then moved to mandates that require vaccination against COVID-19.<sup>69,70</sup> The incentivizing strategies used to increase vaccination rates by different states in the US included large retailers offering gift cards, food, or beverages to recreational park tickets with proof of vaccination.<sup>69</sup> West Virginia in the US awarded 16 to 35 years-old citizens who get vaccinated a 100 dollar savings bond.<sup>69</sup> Maine, another state in the US, had an array of rewards the vaccinated individual could choose, ranging from a fishing license to a \$20 gift card.<sup>69</sup>

One of the more creative strategies was the lottery draw.<sup>71</sup> This strategy proved to be effective in increasing the rates of vaccination, as seen in the state of Ohio.<sup>69</sup> With less than a week of the million-dollar lottery prize announcement for five vaccinated winners, Ohio saw a 6% increase in the vaccination numbers from a 24% week-over-week decrease among people aged 30 to 74 years.<sup>69</sup> The budget for the lotteries that various US states utilized came from the coronavirus relief package that the federal government approved and agreed upon with the expectation of

increased rates of vaccinations along with the proportional benefits to the health of the public.<sup>72</sup>

The Governor of Ohio was criticized over the million-dollar lottery incentive to increase vaccinations, and to that he commented that the loss of lives to COVID-19 when vaccines are available is the true loss.<sup>73</sup>

The mandates for COVID-19 vaccination in the US require employers with more than 100 workers to have their employees vaccinated or tested weekly, employers to give paid time off to get vaccinated, vaccinations for all federal workers and contractors that do business with the federal government, vaccinations for healthcare workers along with a call to large entertainment arenas to require vaccination proof or testing for entry.<sup>70</sup>

In Armenia, a few days after the first batch of COVID-19 vaccination was received, the Minister of Health noted that the Armenian Parliament set the target to have 20% of the total population (about 591,600 people) vaccinated within a year.<sup>74</sup> By June of 2021, this goal was updated to vaccinating 700,000 people by the end of 2021.<sup>47</sup> Since there was a significant vaccine hesitancy captured in the first IRI survey by early May 2021, the Prime Minister of Armenia urged members of the government to get vaccinated to set an example for the public.<sup>48,75</sup> Soon after, he and the ministers, deputies, and other high-ranking officials of the country got vaccinated slightly increasing vaccination numbers during that period.<sup>75</sup> Regular COVID-19 vaccination awareness activities occur in Armenia starting spring 2021 by experts in the field, highlighting the need to increase the vaccination numbers.<sup>76,77</sup> Like most countries around the world, Armenia's government and many health organizations, including World Health Organization Country Office in Armenia, United Nations Children's Fund (UNICEF), International Republican Institute (IRI), WiRED International, and Turpanjian College of Health Sciences, continue to

communicate to the public on COVID-19 updated precautionary measures, including vaccinations, through their websites, social media via video, poster and animation format.<sup>78-82</sup>

As compared to the high number of daily cases recorded at the end of March 2021 with cases in thousands, the start of May 2021 was the period when the third wave was declining with daily cases going low in hundreds.<sup>46,47</sup> To achieve the determined numbers of vaccinations, a plan of action was in development over the summer months and was under review by different ministries of the government when the fourth wave of the pandemic hit by July end causing a surge in the daily new cases and daily deaths.<sup>83,84</sup> The developed plan of action was approved and the government set the regulation that came into effect as of October 1, 2021, to counter the increase in COVID-19 cases with a mandate on all employers to ensure their workers were either vaccinated, or PCR tested every 14 days for COVID-19.<sup>84</sup> The testing mandate for COVID-19 was redrafted and went under review by the Health Ministry where the rule would require COVID-19 testing for the unvaccinated employees to be done every 7 days instead of 14 at the employees own expense.<sup>85</sup> As of December 10, 2021, the order was proclaimed by the Ministry of Health as constitutional as it stemmed from the public health interest, and the Armenian parliament agreed that employees could be fired for the lack of testing or vaccine certificates against COVID-19.<sup>86</sup> A single PCR test is about a quarter of Armenia's minimum monthly salary and with high inflation, citizens would likely prefer getting vaccinated.<sup>84</sup>

Although vaccine acceptance has been slow, the current number of vaccine doses administered is an achievement in Armenia's vaccination journey, which must continue to further increase protection of its citizens from the pandemic and its variant strains.<sup>15</sup>



#### **d. Recommendation for a course of action**

While considering strategies to increase vaccination rates, it is imperative to address public concerns against COVID-19 vaccination as voiced in the second IRI survey such as side effects of the COVID-19 vaccines currently available in the country, information on the effectiveness and protective nature of the vaccines along with the duration of COVID-19 vaccine immunity.<sup>50</sup>

This is taken care of by Armenia's government in Health and its supporting organizations in the form of vaccination promotion information-education campaign.<sup>78-81</sup> Helping people prioritize vaccination is the big step, and the lottery draw strategy is particularly effective in that area which people could otherwise put off for later.<sup>72</sup> Since the mandate requires vaccinations against COVID-19 or taking a PCR test frequently, the usage of financial rewards in the form of a lottery draw may increase vaccination rates.<sup>84,87</sup> A qualitative study conducted in 2019 in Armenia assessed whether personalized invitations and financial incentives would increase primary care screenings and the study showed the two mentioned methods as external motivators.<sup>88</sup>

The recommendation for a course of action is a vaccine promotion in the form of a lottery draw where five citizens of Armenia, aged 18 and older receiving their first dose of COVID-19 vaccine in Yerevan, Armenia during the forty-two-day countdown period of the proposed program, have a chance of winning one million Armenian drams each. The budget for the lottery program can be taken from the grant that was disbursed by the European Union for Armenia's fight against the COVID-19 pandemic.<sup>89</sup> An educational leaflet can be distributed throughout Yerevan, Armenia that specifies details of the lottery draw along with the concerns against COVID-19 vaccines addressed in a frequently-asked-questions format. The leaflet can include COVID-19 vaccine safety with clarification of no serious side effects reported to date in

Armenia along with the mention of hotline numbers that address COVID-19 related inquiries.<sup>90,91</sup>

The Delta variant, which has higher transmissibility and a severe course of the disease, leads to more Intensive Care Unit (ICU) admissions.<sup>92</sup> The likelihood of ICU admissions among those infected with COVID-19 is around 26%.<sup>93</sup> In Armenia, one ICU admission of a COVID-19 patient costs about one million Armenian drams, and therefore, even when the country was seeing daily cases as low as 150 per day, the likelihood of ICU admission among those infected with COVID-19 at 26% would be 39 patients.<sup>94,93</sup> The cost of treating these 39 patients admitted in the ICU would be 39 million Armenian drams equivalent to 86 043 US dollars.<sup>1b</sup> So, when it comes to high numbers of daily cases as seen recently around 2000 infected patients, the cost of treating 26% of those patients would be about 520 million Armenian drams for 520 patients or about 1 147 236 US dollars. The amount for the proposed lottery draw is a million Armenian drams each for five vaccinated citizens of Armenia coming up to five million Armenian drams i.e. 11 031 US dollars and the entire budget for this vaccine promotion lottery draw is 40 749 USD i.e. around 18.47 million Armenian drams (Appendix 2). Therefore, the cost allocated for the vaccine promotion lottery draw program pales in comparison to the cost needed to treat ICU admissions of COVID-19 patients. If the proposed program increases the vaccine administration by 1.5% among the residents of Yerevan, Armenia, this provides protection for the 1.5% with a decreased chance of contracting COVID-19 or if infected with a less severe course of infection.<sup>95</sup>

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<sup>1b</sup>. Calculated with one US dollar at 453.26 Armenian drams exchange rate

### **3. METHODOLOGY**

#### **a. Conceptual framework**

This program is supported by the theory of education, marketing, and law, or as the author, Michael L Rothschild names it carrots, sticks, and promises.<sup>96</sup> The element of education implies the endeavor to inform or persuade the target audience to behave in a particular way voluntarily without providing an immediate reward or punishment. Education can impact existing beliefs and can modify behaviors to achieve rewards in the short or long run. The reward can be a known one, it can be a reward that has not been received before or the education may not have a reward at all. The element of marketing allows the modification of a behavior voluntarily in an environment where there is an exchange for a reward or a reinforcing incentive. Law on the other hand is the opposite to marketing or education such that compliance to the behavioral modification is mandatory and punishment implies for non-compliance. When the likelihood of the desired transactions through the mechanisms of the free market is not achieved, laws and regulations are used.<sup>96</sup> The theory of education, marketing, and law is based on previous theories hypothesized as early as 1977 by Lindblom in the three social control classes of persuasion, exchange, and authority.<sup>97</sup> In Armenia, the element of education was and is still used by the leading health organizations and other supporting institutions affirming the need to be vaccinated while the element of the law came after with the mandate to vaccinate or frequently test negative for COVID-19.<sup>75,84</sup> The element of Marketing can be used to complement the above two strategies with the vaccination promotion lottery drawing that attempts to increase vaccine administration by offering the chance to win one million Armenian drams to the citizens of Armenia who choose to be vaccinated in the specified period. This will act as a reward for participation in the public immunization strategy. Two of the most commonly used types of

financial incentive (FI) interventions by the public health community to promote health-positive behavioral change in the recipients are cash rewards and lottery draw due to their linked behavioral economics (BE) concept of the probability of loss or gain where the recipients perceive gains and losses differently such that more weight is placed on the gains.<sup>87,98</sup> One study hypothesized that individuals who may not be risk-averse in terms of health may be risk-prone in terms of money, therefore financial incentive interventions in the form of a lottery draw may be able to target that specific demographic who delay vaccination.<sup>99</sup>

## **b. Implementation plan**

### The team

A core team of three public health professionals who have prior experience in program planning, program implementation, and program evaluation with one among them who can lead the team and work closely with the Ministry of Health should be hired. Two public health interns and a social media expert will be needed as supporting staff for the proposed program along with fifteen public health students who will help with educational leaflet distribution.

### Program promotion

The proposed lottery draw will be announced through social media, TV, and radio during prime time as well as via leaflets that will be distributed on select days to the public in front of all metro stations and select pharmacies within Yerevan. The contents of the educational leaflet will have 1) answers to frequently asked questions concerning COVID-19 vaccines found in the last IRI survey, 2) the Armenian statistics of COVID-19 vaccine administration and side effects, and 3) the hotline numbers that address COVID-19 related inquiries.<sup>50,90,91</sup> A group of experts will develop the content of the educational leaflet based on thorough literature review. This

educational leaflet will also serve as an advertisement for the lottery draw and contain details about the timeline, eligibility, and other details.

### Eligibility

All those who receive their first dose of the COVID-19 vaccine during the forty-two-day countdown period of the proposed lottery draw, who are citizens of Armenia, aged 18 and above will be eligible to enter the lottery draw. Those receiving their second dose of vaccination will not be eligible for the lottery draw to avoid an early second dose since there is a minimum number of days set between the first and second dose for immunity development against the severity of the coronavirus disease.<sup>100</sup> Individuals receiving additional doses or booster shots of the COVID-19 vaccine will also be ineligible to enter the lottery draw as the program's sole focus is draw those who have not received their first dose and have reservations against taking the COVID-19 vaccination.

### Lottery tickets

All sites within Yerevan that deliver vaccines against COVID-19 will be given lottery tickets such that every Armenian citizen who get their first dose of COVID-19 vaccination on and after the day of the announcement of the lottery program up to the end of the forty-two-day countdown period will receive a lottery ticket and be entered for the lottery draw. When the lottery is drawn and the winners announced, the participants selected will be required to bring the lottery ticket along with a valid ID proof to claim their prize.

### Timeline

Since the COVID-19 vaccines have a short shelf life, the brief timeline of the lottery draw could utilize the vaccines available in Armenia, which would otherwise be wasted if not used before

the expiration.<sup>74</sup> The ideal time to implement the program is soon after government approval is obtained. The date of the lottery announcement must be planned and coordinated with the Ministry of Health so that no shortage of vaccines occurs once the program is implemented. The timeline for the proposed program from planning to evaluation is a hundred days of which the countdown period for the proposed raffle from the announcement to the draw is forty-two days. The number of first doses administered in the same timeframe before the countdown period of the proposed program will be calculated against the period after the countdown to measure changes in vaccination numbers.

The schedule of the proposed program is presented below (Appendix 1):

*First 46 days:*

Planning should begin on day 1 and continue till the 2nd day by individuals who will oversee the project, followed by consultation with the stakeholders on the 3rd and 4th day. Hiring and training the staff can be done from day 5 to 19. Hiring includes seeking out fifteen public health students available to disseminate educational leaflets to the public on select days of the forty-two-day countdown period of the lottery draw. Determining the main pharmacies used by the people, the area near the entrance of which will be used for educational leaflet distribution will be decided on day 20. Researching contents for the educational leaflet will be done by assigned members of the team from day 21 to 23. The team will prepare a manual of the proposed program for staff at vaccine centers on day 24 and 25. The contents of the educational booklet should be crossed checked and finalized with an expert in the field on the 25th and 26th day. On the 27th day, with the help of the social media expert, a QR code will be created for all the lottery tickets as a precautionary measure to avoid fraud or duplication of the lottery tickets.

Printing tickets, educational pamphlets, and program manuals can be done from day 27 to 34. Lottery tickets will be provided to all vaccination centers in Yerevan, and staff at these centers can be educated on the proposed vaccine promotion lottery program through the program manual from day 35 to 40. Booking for the announcement of the lottery draw during prime time on Public TV and radio for day 46 must be done on the 41st and 42nd day. A social media page dedicated to the announcement, details, and countdown of the lottery should be created with its specifics determined by senior members of the team from day 43 to 45. The lottery draw should be announced on Public TV and radio during prime time on day 46 as booked.

*Countdown period of 42 days:*

The social media countdown should start from day 47 till the last day i.e. day 88 of the forty-two-day countdown period of the program in order to keep the public interested and engaged to participate in the proposed program. During this same period from day 47 to 88, the educational leaflet will be distributed to the public, every four days of the week ideally every Thursday to Sunday until the end of the forty-two-day countdown period of the program so that people will be reminded and more likely to have time on the weekend to go get vaccinated. All sites of the educational leaflet distribution will be numbered and randomly assigned to each member of the team so that field checks can be conducted. All distribution sites must be covered for field checks within the span of the forty-two-day countdown period of the program. Likewise, all vaccine centers will be recorded, numbered, and randomly assigned to each member of the team during the forty-two-day period to conduct field checks ensuring lottery tickets are only given to those receiving their first dose of COVID-19 vaccine and correct data is collected from the individual. The data here mainly refers to the question the vaccine staff will ask the participant on their awareness or ignorance of the vaccine promotion lottery draw (Appendix 4) along with

their socio demographic characteristics. Once a vaccine center is selected for the field check, it will be excluded from the next draw so that the same vaccine center is not visited twice and all centers are covered. Secondary data will be collected via a secure messaging platform on a daily basis from vaccination sites where the primary care provider performs this function as part of their regular program.

*Last 12 days:*

The lottery will be drawn on day 89 and ARMED will be assigned to distribute the cash prizes so that the identity of the five participants will be protected. The draw will occur at 17:00 hrs. when the general population retires after their work day. Secondary data collection from ARMED, the national digital health registry, which will occur on a daily basis. Collection of the data directly from ARMED will prevent fraud. The remaining activities will be completed as scheduled and the program will end on day 100.

**c. Evaluation plan**

Adapting from programs of similar nature, it is anticipated conservatively that there will be a 1.5% increase in the total number of first doses of COVID-19 vaccine administered from this vaccine promotion lottery program among the residents of Yerevan, Armenia during the forty-two-day countdown period of the proposed program.<sup>69,101</sup> To calculate this increase, the number of first doses of COVID-19 vaccine administered forty-two days prior to the forty-two-day countdown period of the program will be compared with the number of first doses administered during the forty-two-day countdown period of the proposed program.



The proposed program is a one-time pilot program and if it meets or exceeds the expectations in increasing the first doses of COVID-19 vaccine uptake in Yerevan, programs of similar nature can be implemented in other marzes that have low vaccination rates.

### Study variables

The evaluation design is a pre/post-test independent group design OXO. The dependent variable is the number of people receiving their first dose of vaccination before the intervention and during the intervention. The intervening variables will be age and gender. All data will be collected through the ARMED, a national digital health system used in Armenia.<sup>102</sup>

### Threats to Internal validity

*History* can be a threat as other events occurring in the same timeline may influence the dependent variable.

*Maturation* is not a threat since the countdown period of the program lasts less than two months and the short time frame may not influence the dependent variable. Moreover, it is an independent group design.

*Testing* is not a threat since data will only be collected once from the participants and the participants are different in the pre- and post-assessment groups.

*Instrumentation* is not a threat since the data will be collected through the ARMED database for pre and post-assessments.

*Statistical regression* is not a threat since the participants are not selected due to their outlying characteristics related to the outcome variable.

*Selection* may be a threat since the characteristics of the population receiving vaccination before the program and during the program may be different from one another, hence, the difference in the numbers might not be related to the intervention but the sociodemographic characteristics of those who get the first dose of the COVID-19 vaccine before and during the program.

*Experimental Mortality* is not a threat since data will be collected from independent groups.

*Compensatory rivalry* is not a threat since there is no comparison group.

*Selection-history* may be a threat as the participants who took the vaccination before and during the program have different characteristics and may have been influenced by other events differently that occurred before and during the program that lead them to react differently to the dependent variable.

#### Threats to External Validity

*Testing Treatment Interaction* is not a threat since testing will not be a threat to internal validity. Therefore, when implemented in other settings, testing treatment interaction will not be a threat to generalizability.

*Selection Treatment Interaction* is a threat since the population characteristics might be different in other settings and their reaction to the intervention might not be similar.

*Reactive Effect* is not a threat as data on individuals who participate in the vaccination before and after the lottery draw would be collected from existing databases and the participants then would not be able to react differently to the presence of the program evaluation and the generalizability of the findings will not be influenced.

*Multiple Treatment* effects are a threat as the group in intervention may be subject to other interventions not present in other settings, allowing for the results from this intervention to be less generalizable in other settings.

#### Data entry and Analysis

Data is collected on a daily basis from ARMED and ARMED will assign a special ID for each participant so that the identity of the participant may be protected. Information on the participants (Appendix 4) collected on a daily basis from ARMED through messaging platforms will be cross-referenced at the end of the program with ARMED to prevent any mistakes in evaluation. The total number of lottery tickets given to all those who take their first dose in the forty-two-day countdown period will be counted and checked against the total number of first doses given forty-two days prior to the forty-two-day countdown period of the program for an initial determination of the success of the project. Evaluation should commence on day 91 and be completed by day 98; the team will conduct the evaluation. The main variable of interest and the socio-demographic characteristics of the participants will be defined by descriptive statistics. The report will be prepared on day 99 and disseminated among the stakeholders by day 100.

#### **4. BUDGETING**

The budget is calculated according to the current market prices in Armenia (Appendix 2). The budget is allocated for operational expenses, administrative expenses, and educational material expenses. The total cost of the operational expense is 29 459 US dollars. The total cost of the administrative expense is 6 714 US dollars. The total cost of the educational material expense is 3 116 US dollars. Overall, the total budget is estimated at 39 289 US dollars, which can be taken

from the grant that was disbursed by the European Union for Armenia's fight against the COVID-19 pandemic.<sup>89</sup>

## **5. ETHICAL CONSIDERATIONS**

### **a. Community acceptance of the program**

In the latest IRI survey done in July the two most popular answers to the question “How the government should continue its fight against COVID-19?” were: 1) impose stricter measures for transportation, restaurants, cafes, offices, factories, and other indoor activities and 2) the government should talk more about vaccinations.<sup>50</sup> Therefore, this program can be introduced as a way of continuing Armenia's fight against COVID-19. There might be negative perceptions of the lottery draw as a form of gambling. For that reason, the program must be described as a way to secure the health status and economy of the country through awareness-raising and incentive-motivation to get more people vaccinated. This way, the lottery program should be well received in Yerevan where the program is implemented.

### **b. Ethical considerations**

There is a likelihood that people who have low socioeconomic status may be more willing to participate in the vaccine promotion lottery draw but it is beneficial for this group to take vaccinations as they will have stronger protection against COVID-19.<sup>103</sup> To make sure the project is in line with local and international ethical regulations and norms, the project proposal was submitted for approval to the American University of Armenia's Institutional Review Board and it has been accepted to follow the Community Service Grant Proposal Framework. The study protocols at this stage comply with the requirements of the AUA IRB. Once funding to

implement the proposed project is obtained another application will be made for an IRB review to approve the updated protocols. To collect non-identifiable data from the ARMED system on those who received their first dose of vaccine before and during the forty-two-day countdown period of the proposed program, permission will be obtained from the Ministry of Health. ARMED will ask the winners of the lottery draw if they want their win to be publicized and if consent is given, then the winners of the lottery draw will be advertised so that it will attract more people to participate if a program with a similar strategy takes place in the future.

**c. Integration of proposed program with existing community resources**

With the current awareness placed by health institutions and the government on the urgency to vaccinate along with the mandate to push vaccine numbers up, this program may be able to foster support as it is necessary to achieve herd immunity.<sup>84</sup> All the project activities will be coordinated with existing COVID-19 vaccine promotion endeavors in Armenia.

**d. Sustainability beyond the funding period.**

When the pilot program is completed and if evaluation demonstrates its success, other marzes or regions that see very low COVID-19 vaccine rates may implement the same strategy. The next program may also focus on those in the high risk group of COVID-19 disease severity (e.g., older age citizens). Once the project proves to be a success, it will be self-sustainable as the cost will be covered by savings from preventing hospitalizations and deaths due to COVID-19.

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## 7. APPENDIXES

### Appendix 1: Timeline

Activities	First 46 days	Countdown period-42 days	Rest 12 days
Plan	Day 1, 2		
Consult with Stakeholders	Day 3, 4		
Hire Staff	Day 5 to 19 (15 days)		
Train Staff	Day 19		
Determining major pharmacies	Day 20		
Educational leaflet content researched and determined.	Day 21 to 23		
Creating a program manual for staff at vaccine centers.	Day 24, 25		
Educational leaflet content approved by an expert on the subject and finalized.	Day 25, 26		
Creation of a QR code for the lottery tickets.	Day 27		
Print lottery tickets, educational leaflets, and program manuals.	Day 27 to 34 (8 days)		
Assign lottery tickets to vaccine centers	Day 35 to 37		
Educate staff at vaccine centers about the program through the program manual.	Day 38 to 40		
Book a time slot for the announcement of the lottery draw during prime time on Public TV and radio.	Day 41, 42		
Create a social media page	Day 43 to 45		
Lottery draw announcement on Public TV and radio during prime time	Day 46		



Social media countdown of the lottery draw begins		Day 47 to 88 (42 days)	
Distribution of educational leaflets every four days of the week until the program ends. (Thursday to Sunday)		Day 47 to 88 (42 days)	
Lottery Draw (17:00)			Day 89
Secondary data collection from ARMED			Day 89 to 90
Evaluation			Day 91 to 98 (8 days)
Preparation of report			Day 99
Dissemination			Day 100
			Timeline: 100 days

## Appendix 2: Budget estimate for the proposal

### Operational Expenses

Personals	Number of work unit	Amount per month in USD	Duration of the month	Total budget in USD
Public Health Staff	3	600	Three months and ten days	6 000
Social Media Expert	1	600	Three months and ten days	2 000
Public Health Interns	2	300	Three months and ten days	2 000
Public health students (every four days of the week until the end of the countdown: every Thursdays to Sundays)	15	2.63 USD /hour. Therefore for 8 hours or per one day = 21.04 USD Therefore, a total of 24 days= 504.96 i.e 505 USD	-	7 575
Other expenses				
Lottery prize	5	2091	-	11 031
Printing tickets	2500 pages	.031 per page (each page should have 40 tickets i.e. 10 rows and 4 columns) (Total of 100,000 tickets)	-	78
Participant detail form	25,000 pages	.031 per page (each page should have four forms)	-	775

		with a total of 100,000 forms)		
				Total = 29 459 USD

### Administrative Expenses

Office space and utilities				
Office rent (furnished)	1	500	Three months and ten days	1 667
Laptops	6	500	-	3 000
Communication				
Phone credit	6	41.49	Three months and ten days	830
Wi-Fi	1	15	Three months and ten days	50
Travel expenses				
Taxi fare/Travel budget	5	200	-	1 000
Other expenses				
Maintenance: Electricity Water Miscellaneous	1	50	Three months and ten days	167
				Total = 6 714 USD

### Educational material Expenses

Program Manual for staff	500	.031	-	16
Educational leaflet for the participants	100,000	.031 per page	-	3100
				Total = 3 116 USD



Appendix 4: Participant questionnaire

<b>Participant Lottery Number:</b> _____		
<b>ARMED Special ID:</b> _____		
<p><b>This section addresses the key characteristic of the participant who is an Armenian citizen, 18 and older, receiving their FIRST DOSE of the COVID-19 Vaccine.</b></p> <p><b>Please mark the right answer.</b></p>		
No	Question	Coding category
1.	Are you aware of the COVID-19 vaccine promotion lottery draw?	Yes 1 No 2