

Machine Learning to Determine COVID - 19 Awareness and Knowledge among the Housemaids in Mizo Population

Brindha Senthilkumar¹, Senthilkumar Nachimuthu², Ganesh³, Rai³, Lal Hmingliana^{1*}

¹Department of Computer Engineering, Mizoram University, Mizoram, India

²Department of Biotechnology, Mizoram University, Mizoram, India

³Department of Computer Engineering, Zoram Medical College, Mizoram, India

ABSTRACT

AIM

The aim of this study is to determine the level of awareness and knowledge among the housemaids in Mizo population using machine learning model.

METHOD

105 housemaids of both genders have responded the well-structured questionnaire to determine the level of awareness and knowledge about COVID-19. Logistic regression model was built using the 21 features which are related to awareness and knowledge about COVID-19.

RESULT

The results revealed COVID-19 knowledge and awareness accuracy of 92.5 %, precision, recall and f₁-score of 96.1 %, and brier score of 0.074.

CONCLUSION

The study showed the knowledge and awareness among the housemaids are highly associated with wearing appropriate masks while outdoors, social distancing, dos and don'ts during lockdown, and self-update about COVID-19 awareness information *via* social and authenticated government medias. There is no significant knowledge gap is observed about the awareness and knowledge about COVID-19 among the housemaids in Mizo population.

KEYWORDS

COVID-19, Machine Learning, Housemaids, Awareness, Knowledge

**Corresponding Author:*

Brindha Senthilkumar, Department of Computer Engineering, Mizoram University, Mizoram, India; Email: Senthilkumar@gmail.com

How to Cite This Article:

Senthilkumar B, Senthilkumar N, Ganesh, et al. Machine Learning to Determine COVID - 19 Awareness and Knowledge among the Housemaids in Mizo Population. J Evid Based Med Healthc 2022;9(8):2.

*Received: 24-Jan-2022,
Manuscript No: JEBMH-22-47275;
Editor assigned: 26-Jan-2022,
PreQC No. JEBMH-22-47275
(PQ);
Reviewed: 09-Feb-2022,
QC No. JEBMH-22-47275;
Revised: 24-Mar-2022,
Manuscript No. JEBMH-22-47275
(R); Published: 31-Mar-2022,
DOI:
10.18410/jebmh/2022/09/8/2*

*Copyright © 2022
Senthilkumar B, et al. This is
an open access article
distributed under Creative
Commons Attribution License
[Attribution 4.0 International
(CC BY 4.0)]*

INTRODUCTION

Corona virus has been spreading around the globe and becoming threat for human survival since 2019 till today.¹ This virus causes severe respiratory distress by exhibiting symptoms like fever, difficulty in breathing, cough, sore throat, sneezing, body ache, low of smell, abdominal discomfort, diarrhea, and people with weak immune response can also cause pneumonia and multiple-organ failures.² The infected people transmit the infection 2 days before they develop the symptoms and during their early stage of their illness. Thus avoiding crowded places, close-contacts and confined in the poor ventilated areas are more prone to transmit the corona virus rapidly.³ Meera conducted a quantitative study about hygiene measures and awareness of corona virus conducted among the Indian academicians and students in the year 2019 reveals that there was a significant gap about the awareness, best hygiene practices, and information about the COVID - 19.⁴ Awareness study on health care professionals and students in Mumbai city showed a high of 71.2 % awareness among undergraduate medical students, 45.4 % were aware of wearing mask/respirator and 52.5 % aware about the hand hygiene.⁵ In May 2019, a web-based cross-sectional awareness and anxiety study about COVID-19 among the graduates and postgraduates students of South India revealed that there were increased financial anxiety due to job loss, but well-known about the precautionary and preventive measures of corona virus.⁶

Priya and Sherkhane showed that interns have adequate knowledge about the transmission and preventive cares of corona virus, and newspapers and televisions were their primary and reliable mode of information source, the study was conducted in April 2020.⁷ A cross-sectional study conducted between February to May 2020 among the health care works of coastal Karnataka revealed that participants were well aware of precautions and treatments of corona virus, but had a fear of acquiring the COVID - 19 infection in due course of time.⁸ There was 80 % awareness and knowledge about the COVID - 19 among the MBBS students of Jammu and Kashmir.⁹ A snowball sampling technique was utilized to study the awareness, action and attitude about corona virus among the elder population in rural areas of Mysore district revealed that elder population was well aware to avoid indoor and outdoor gatherings, handshakes, and precaution and prevention measures.¹⁰ Knowledge and awareness index among the physiotherapy students to combat corona virus showed a very positive co-relation with respect to mode of transmission and preventive measures about this infection.¹¹ Data collected throughout India *via* web-based mode showed 98 % people were aware that virus spreads *via* droplets (human to human) and 95 % were known about the cause of this disease. It also showed that apart from social awareness about COVID - 19, it is mandatory

to follow the rules and regulations framed by the government to overcome this pandemic effectively.¹²

From the above set of studies it was clear that awareness and the preventive measures about COVID - 19 have become more reachable to public from February 2020 onwards. Though the digital medias like youtubes, facebook, whatsapp and government media were playing a key role in spreading the information about the disease, still the information were able to reach out the public appropriately after 5 to 6 months of this COVID - 19 pandemic outbreak in India.¹³ But the anxiety of acquiring the disease and financial anxiety due to job loss have been persisting throughout the pandemic times. This paper focuses on constructing an automated machine learning model to find the level of awareness among the housemaids in Mizo population. Housemaids play a major role of disease transmission because of their mode of work and in Mizoram maximum house chores are done by housemaids.

MATERIALS AND METHODS

This study was conducted in Aizawl, Mizoram using a well-structured hardcopy questionnaires, the questions were answered *via* personally and over the telephonic conversation (Table 1). A set 105 housemaid volunteers had participated in this study by giving their informed consents.

S. No	Features	Answers /Type
1	Name	Categorical
2	Age	Numerical
3	Sex	Male Female
4	Education	Primary Higher Secondary No schooling Less than 5 hours
5	Number of Hours Work/Day	Great than 5 hours
6	Fever a symptom of COVID-19?	Yes No No Idea
7	Cough a symptom of COVID-19?	Yes No No Idea
8	Can dustbin/baskets transmit COVID-19?	Yes No No Idea
9	Can door handles/water taps transmit COVID-19?	Yes No No Idea
10	Can water bottles transmit COVID-19?	Yes No No Idea
11	Can currency notes / coins transmit COVID-19?	Yes No No Idea
12	Can coughing / sneezing without covering the	Yes

	mouth and nose spread the COVID-19 infection?	No
		No Idea
13	Eating fast food from street vendors can spread the COVID-19 infection?	Yes
		No
		No Idea
14	Does staying in the crowded place spread the COVID-19 infection?	Yes
		No
		No Idea
15	Does travelling in crowded public transport spread the COVID - 19 infection?	Yes
		No
		No Idea
16	Does touch an infection person spread the COVID-19 infection?	Yes
		No
		No Idea
17	Does touching infected person's belonging spread the COVID-19 infection?	Yes
		No
		No Idea
19	There is no harm to buy veg /groceries in a crowded place	Agree
		Disagree
		No Idea
20	It is better to avoid guest/visitors during the lockdowns	Agree
		Disagree
		No Idea
21	Going out for work or meeting people should be restricted	Agree
		Disagree
		No Idea
22	Do you maintain social distancing during outdoor activities	Yes
		No
		No Idea
23	Is Covid-19 a communicable disease?	Yes
		No
		No Idea
24	Do you self-update yourself about Covid-19 information	Yes
		No
		No Idea

Table 1. COVID-19 Awareness Questionnaire for Housemaids.

The above questions answered were framed into a dataset with 23 independent features and one dependent feature. The machine learning was devised on these features to determine the level of awareness about COVID - 19 infections and its transmission based of model's accuracy and brier score. Python Jupyter Notebook Version 3 platform was used to build logistic regression using learning packages from scikit-learn (0.20.4). Data preprocessing, visualization and interpretations were done using numpy (1.16.6), pandas (0.24.2), seaborn (0.9.1), scipy (1.2.3) and matplotlib (2.2.5).¹³

Work Flow

The dataset was preprocessed for outliers and anomalies, it was divided 70 % as training dataset and rest 30 % was reserved as testing dataset. Logistic regression model was developed using training dataset. Testing dataset was applied on the model to check its performance with metrics: accuracy, precision, recall, f_1 score and brier score (Figure 1).

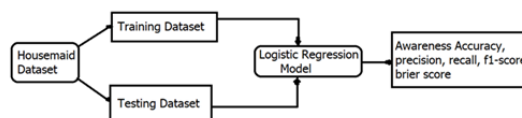


Figure 1. Flow chart of Logistic Regression Model.

RESULTS AND DISCUSSION

Logistic regression model produced an awareness accuracy of 92.5 %, precision, recall, f_1 -score of 96.1 % and brier score of 0.074. Model showed approximately 93 % of the participants were aware of the COVID - 19 infections and its transmission. The model's confidence in prediction is graded based on the brier score, this allows user to appropriately calibrate the machine learning models.¹⁴ A brier score of 0 is said to be an appropriate prediction and score of 0.25 for worst prediction, in this study the brier score was 0.074 which was close to 0.¹⁵ The significant features which were highly co-related to the awareness were features 6 to 23 from (Table 1).

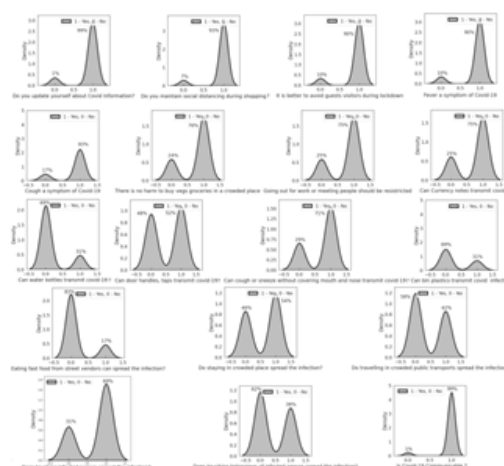


Figure 2. Distribution Plot of the Covid-19 Dataset of Housemaids from Mizoram

Distribution plot reveals that the features: Do staying in crowded place spread the infection? Do travelling in crowded public transports spread the infection? Does touching belongings of infected person spread the infection? Can door handles, taps transmit COVID-19? and can water bottles transmit COVID-19? Showed less awareness about the corona virus infection (Figure 2). Apart from the above features, awareness levels of other features were considerably at the satisfactory level (Figure 2). Though 99 % of the housemaids were aware that COVID-19 is a communicable disease but still they lack adequate level of knowledge. From the data, it was shown that only 1% of the participants were not updating themselves about the COVID-19 awareness and precautionary measures *via* government information source or social media. It was significantly noted that sign and symptoms of

the corona virus were well-known to the participants of this study than their awareness about the mode of transmission paths. Lack of awareness about the mode of corona virus transmission may be due the 5% illiterate homemade participants, the education has been playing a key role in the controlling the COVID-19 transmission.¹⁶

Logistic regression is one of the simple forms of the machine learning algorithm which can perform well on less number of instances in a dataset. The awareness accuracy in this present study had been reduced due to inappropriate answers received about the mode of transmission of corona virus. From Figure 2, it was very obvious nearly 83 % of the people disagree that street foods can transmit COVID-19 infection, but this can be possible *via* the street vendors who are selling the foods.¹⁷ There was 69 % awareness about spread *via* infected people but they were lacking the knowledge about the infected people belongings can spread the corona infection which was 62 % disagree this question. About 93 % of the people accept that they follow social distancing in outdoors and 75 % of the people were cautious about the COVID - 19 infection transmissions can be *via* currency notes, but still 58 % agreed that it is safe to travel in crowded public transport and 46 % agreed crowded places do not transmit the disease. In spite of 99 % people have agreed that corona virus is communicable, they failed to understand the core mean of the transmission of communicable disease.¹⁸ there were many contradictory knowledge spread about the COVID - 19 transmission and prevention, which can be handled by conducting more COVID - 19 prevention and transmission awareness programs as it fill the knowledge gap.¹⁹

CONCLUSION

The present study predicts the awareness among the housemaids was 92.5 % by logistic regression. There was adequate awareness about the signs and symptoms of corona virus rather than the mode of COVID - 19 transmissions. This study had focused on the bottom-line workers, housemaids, of the Mizo society as they are the important people who commute every day and visit more places than any other daily working people. More awareness outreach program can fill this knowledge gap which can be one of the significant measures to be taken to reduce the number of spreading COVID-19 cases in Mizoram.

REFERENCES

1. Bai Y, Yao L, Wei T, et al. Corona Virus (COVID-19) Awareness Assessment - A Survey Study amongst the Indian Population. *J Clin Med Res* 2020;2(4):2582-4333.
2. Qutob N, Awartani F. Knowledge, attitudes and practices (KAP) towards COVID-19 among Palestinians during the COVID-19 outbreak: A cross-sectional survey. *PLoS ONE* 2021;16(1):0244925.

3. Li Y, Qian H, Hang J, et al. Probable airborne transmission of SARS-CoV-2 in a poorly ventilated restaurant *Build Environ* 2021;196:107788.
4. Ranjith M. Awareness about COVID-19: A Study on Indian Academicians and Students. *Healthcare Review* 2019;1(1):24-35.
5. Modi P D, Nair G, Uppe A, et al. COVID-19 Awareness Among Healthcare Students and Professionals in Mumbai Metropolitan Region: A Questionnaire-Based Survey. *Cureus* 2020;12(4):7514.
6. Kanagaraj P, Kanagaraj A, Srinivasan M, et al. Awareness, anxiety, and coping regarding COVID-19 among south Indian population: web based cross sectional survey. *Int J Com Med* 2020;7(9).
7. Priya P, Sherkhane M. Awareness of coronavirus disease (COVID-19) pandemic among interns of a tertiary care hospital. *Int J Med Sci Public Health* 2020;9(6):375-381.
8. Unnikrishnan B, Rathi P, Shenoy S M, et al. Knowledge, awareness, and perception, of COVID-19 pandemic among health care workers in a tertiary care teaching hospital in coastal South India. *Open Public Health J* 2021;14:135-139.
9. Farooq M, Javed A, Mir S A. Assessment of knowledge, awareness and practice of MBBS students regarding COVID-19 pandemic. *IJHCR* 2021;4(9):54-57.
10. Nanjunda DC, Lakshmi JS. Awareness, attitude, and action about COVID-19 among Rural Elders: A cross-sectional rapid pilot survey. *BLDE Univ J Health Sci* 2021;6:75-81.
11. Jangra M, Saxena A, Anurag P. Knowledge and awareness among physiotherapy students to combat COVID-19: A questionnaire based study. *Clin Epidemiology Glob Health* 2021;11(5):100-748.
12. Singh AK, Agrawal B, Sharma A, et al. COVID-19: Assessment of knowledge and awareness in Indian society. *J Public Affairs* 2020;20(4):2354.
13. Hunter J D, Matplotlib. A 2 D graphic environment. *Computing in science and engineering. Comput Sci Engine* 2007;9(3):90-95.
14. Brier GW. "Verification of forecasts expressed in terms of probability". *Mon Weather Rev* 1950;78(1):1-3.
15. Gerds TA, Cai T, Schumacher M. The performance of risk prediction models. *Biom J* 2008;50(4):457-79.
16. Al-Hanawi Mohammed K, Angawi Khadijah, Alshareef Noor, et al. Knowledge, Attitude and

Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontiers in public health* 2020;8:217.

17. Shumaila Zeb, Syed Shahwar Hussain, Asma Javed. COVID-19 and a way forward for restaurants and street food vendors. *Cogent Business and Management* 2021;8(1):1923359.

18. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med* 2020;27(2).

19. Bell DM. Public health interventions and SARS spread, 2003. *Emerging Infectious Diseases*. Epub 2004;10(11):1900-1906.