

Research Article

Effect Of Implementation Of Lockdown On Pattern Of Washing & Disinfection Of Raw Fruits & Vegetables In India Amid Twenty Twenty's Pandemic: Analysis Of Populace Perception Knowledge And Practice By Descriptive Analysis And With GIS Choropleth Mapping

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Abstract

Washing fruits and vegetables has always been an important habit to be followed at all times. In the existing pandemic due to coronavirus, it has gained doubly importance & it is indispensable now to take extra care while doing so. To get an idea about people's knowledge perception and practice of disinfection online survey was conducted during great Indian lockdown. In a way it was also an attempt to create awareness among general public about disinfection of fruits and vegetables. Results showed that By and large the respondents represented homogenous group of unmarried north Indian young generation of middle income group. Highlights of results are as follows: 58.47 % respondents preferred buying open fruits and vegetables. 65.33% respondents Clean vegetables and wash hands simultaneously after buying. Only 46.61% respondents know that washing raw fruits and vegetables with Normal Water/running water is sufficient amid corona The respondent's perceptions and knowledge about the right practice of fruits and vegetable washing and disinfection differ as per their level of education. It is noteworthy to mention that the even young graduation pursuers have confusion about it.

Keywords: lockdown, corona, covid-19, fruits & vegetables, disinfection, washing, survey, online survey, GIS, choropleth mapping.

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Introduction

In recent years, as a consequence of the increasing number of produce-related outbreaks of food-borne illness, greater attention has been given to interventions that kill or remove human pathogens on fresh produce. An important purpose of washing, disinfection and sanitizing treatments, therefore, is removal or inactivation of such pathogens. On the other hand, published information put forwards that conventional washing and sanitizing processes, even implementation of newer sanitizing agents, are not proficient of reducing microbial load by more than 90 or 99 %, although greater efficacy is required to assure product safety. The reaction of microorganisms to washing & sanitization treatments to some extent will depend on the circumstances of contamination that affect attachment and survival on surface of produce. Chief aspects limiting efficacy of decontamination include attachment & growth in cuts and punctures, biofilm formation, inaccessibility of attachment sites, internalization of microbial contaminants within plant tissues, and strength & rapidity of microbial attachment [1, 2].

Therefore washing fruits and vegetables has always been an important habit to be followed at all times. In the existing pandemic due to coronavirus, it has gained doubly importance & it is indispensable now to take extra care while doing so. Some people are now even switching to vegetable washes, disinfecting liquids for fruits & vegetables rather than only washing in running/tap/plain water. While many food scientists advise against the use of chemical based products due to the potential risk of residues and chemical buildup, some suggest that a diluted mild detergent solution can be used with proper rinsing of fruits and vegetables with clean water, especially when chances of viral contamination are higher [3].

According to WHO There is currently no evidence that people can catch COVID-19 from food, including fruits and vegetables. Fresh fruits & vegetables are element of a diet for wellness and their consumption should be persuaded. Wash fruit & vegetables the same means one would in any other situation. Before touching them, wash your hands with soap and water. Then wash fruits and vegetables thoroughly with clean water, especially if you eat them raw [4].

Prevention of spread of corona-virus

FSSAI carved up guidelines for cleaning of vegetables & fruits! Since the early days into the spread of coronavirus, experts and health authorities have been asking people to be very cautious and maintain cleanliness on all surfaces and objects around them, including food items. Now, the Food Safety and Standards Authority of India (FSSAI) has shared some guidelines for the proper cleaning of vegetables and fruits to prevent the spread of coronavirus through them, even as there is no certainty yet about whether the vir FSSAI directed people to keep the fruits and vegetables, recently purchased from vendors, in their packaging itself in an isolated corner of the house for some time.

Consumers should then wash the vegetables thoroughly using lukewarm water. Alternatively, consumers can also put a drop of 50-ppm chlorine in warm water and dip the produce in the solution.

The vegetables and fruits should be cleaned using clean drinking or potable water.

Consumers should be very careful and should avoid using disinfectants, soaps or cleaning wipes to clean produce.

The vegetables and fruits that need to be kept in the refrigerator should be stored there and other produce should be kept at room temperature in racks or baskets, FSSAI said.

FSSAI had recently also issued guidelines to be followed after returning from shopping trips.

The governing body had asked consumers not to store or leave their food items in the garage or the cars, outside the house, as it could originate problems like temperature abuse or exposure to pests.

The food packaging must be sanitised or disinfected using alcohol-based solutions or with soap and water, the authority said.

The sink and platform used for the washing of vegetables and fruits must be cleaned. It should be ensured that nothing drips or falls onto the floor from the sink or the platform, and if it does, one must wipe the floor immediately [5].

Materials and Method

Framework abstract

Relevant studies were identified where online surveys conducted through a set of survey questions were sent out to a target sample and the members of this sample responded to the questions. Respondents receive online surveys via various mediums such as email, embedded over website, social media etc. Closed-ended questions were asked to the respondents for specific responses to choose from. This resulted in quantitative data.

Data from previous research works was also studied.

Development of question-Naire data analysis

Decision of the research goal: In the present scenario of COVID-19 the purpose of this survey was to get an idea about people's knowledge perception and practice of disinfection. In a way it was also an attempt to create awareness among general public about disinfection of fruits and vegetables

- Preparation of the questionnaire for the survey. By keeping above search in mind we prepare a survey which contains all the aspects and aim of our research.
- Invitation to the participant. By applying a Logistic approach and am in the interest of the participants, invite them to take part in our survey.
- Gathering of Information and analysis of results. The responses of participants were collected in a coherent manner which makes its analysis easier and more conveyable and their responses were started on some basis: age, region etc. and studied thoroughly to find the possible outcome.

Assortment of study area

The study has been conducted online in different cities of India, The Pandemic situation of COVID-19, did not allow the researcher to visit a particular area and survey. So we developed Google forms and sent to the people residing in different parts of India.

Data compilation & sample size

The form was sent to 130 people. Out of 130, only 118 people responded and participated in the survey. Hence the sample size has been taken as 118.

Most of the respondents filled the structured questionnaire on the same day while some of them took few days to complete the questionnaire due to their busy work schedule, and then submitted their responses

Analysis of data

The collected data was analyzed to obtain descriptive statistics of frequencies and percentage of responses and to prepare the statistical table presented in the chapter.

The collected information was conjointly utilised to arrange thematic Choropleth map with bar chart to represent applied math knowledge through varied shading patterns or symbols on preset geographic areas (i.e. India) with the help of Q-gis software as it is good at utilizing data to easily represent variability of the desired measurement, across a region.

Results and Discussion

Socio-demographic profile of respondents:-

Out of 118 respondents 59.83 % were male, 42.37 % were graduates. As can be seen from table home states of maximum respondents' was U.P., i.e. 89.29 %, almost 90 % were pursuing studies, 94.12 % were unmarried, 73.4 % were from 10-75k monthly income group and 83 % respondents belong to nuclear family i.e. 2-8members in the family.

It is a stated fact that, one needs a substantially unanimous sample to draw any meaningful conclusions statistically. If a sample has many socio-demographic sub-groups might trim sample downward to a collection of less relevant sample(s). These samples could then not be effective to draw any meaningful conclusions from.

In the luminosity of this central fact socio-demographic profile of the respondents of this research is pertinent as most of the respondents belong to same socio-demographic profile i.e. college going, non/part time working, unmarried middle class north Indian males from nuclear families. Data taken from this sample is suitable to illustrate momentous conclusions.

The result obtained from the survey conducted was analysed and to conclude the research the result was analyzed as given below:

Table Survey Responses

Question	Options	Percentage
1. What is your gender?	A. Male	59.83
	B. Female	40.17
2. To which Indian state you belong?	A. Uttar Pradesh	89.29
	B. Bihar	5.36
	C. Maharashtra	0
	D. Rajasthan	0
	E. Madhya Pradesh	4.46
	F. Andhra Pradesh	0
	G. Gujarat	0
	H. Uttrakhand	0.89
	I. Telangana	0
	J. Kerala	0
	K. Tamil Nadu	0
3. What is highest degree Or level of education you have completed?	L. Punjab	0
	A. High School	45.76
	B. Bachelor Degree	42.37
	C. Master Degree	11.02
	D. PhD or higher education	0.85
4. Are you married?	A. Yes	3.36
	B. No	94.12
	C. Prefer not to say	2.52
5. What is your current employment status?	A. Employed full time	11.30
	B. Self employed	18.26
	C. Seeking opportunities	65.22

	D. Employed part time	5.22
	E. Retired	0
6. What is your annual household income?	A. Less than 250000	51.38
	B. More than 250000	22.02
	C. Less than 50,0000	9.17
	D. More than 50,0000	17.43
7. How many family members do you have?	A. Less than 5	52.10
	B. More than 5	31.93
	C. Less than 10	10.08
	D. More than 10	5.88
8. Do you prefer buying open fruits and vegetables from vendors during this time of COVID 19?	A. Yes	58.47
	B. No	41.53
9. What do you take the first step after bringing the vegetables or fruits?	A. Wash your hands with the use of soap	11.33
	B. Wash the vegetables	8
	C. Clean your vegetables and wash your hands simultaneously	65.33
	D. keep the vegetables aside and sanitize hands	15.33
10. Which disinfectant or aseptic method you find easy to perform to clean the fruits and veggies?	A. Blanching	12.24
	B. Chlorine	5.44
	C. Sanitizer	10.88
	D. Water with salt/vinegar	38.10
	E. Normal Water / running water	29.93
	F Other chemicals	3.40
11. According to health benefits in context with COVID 19, which vegetable or fruits do you consume?	A. Citrus fruits (orange, lemon etc)	19.43
	B. Leafy vegetables (spinach, lettuce etc)	13.10
	C. Ginger	13.54
	D. Garlic	12.23
	E. Borcoli	2.62
	F. Cucumber	6.99
	G. Mushroom	3.06
	H. Tomatoes	10.92
	I. Carrots	6.11
	J. Blackberries	1.97
	K. Strawberries	1.31
	L. Pineapple	1.75
	m. apple	6.99
12. Do you find easy and safe to wash vegetables and fruits using the chemical disinfectants available in the market?	A. Yes	47.06
	B. No	31.93
	C. Can't say	21.01
13. What type of health problems can occur if we intake chemically cleaned fruits and vegetables?	A. Vomiting	12.40
	B. Nausea	4.96

	C. Abdominal pain	7.44
	D. All of the above.	75.21
14. According to WHO and FDA. What is the best way to clean the fruits and vegetables?	A. Clean them with soap and detergents	14.41
	B. Simply wash them with running water	46.61
	C. None of the above	26.27
	D. All of the above	12.71
15. Do you think UV light can kill corona virus from fruits and vegetables?	A. Yes	23.53
	B. No	37.82
	C. Can't say	38.66
16. Do you think that social media and news handles are giving authentic knowledge about cleanliness and disinfection of fruits and vegetables?	A. Yes	23.53
	B. No	37.82
	C. Not much	38.66
17. Do you prefer going out buy grocery or ordering them online during this pandemic?	A. Going out	40.83
	B. Ordering online.	59.17
18. Do you find this survey useful?	A. Yes	88.89
	B. No	11.11

Descriptive analysis

Prefer buying open fruits and vegetables during COVID 19

As can be seen in the Table 58.47 % respondents preferred buying open fruits and vegetables during COVID 19.

First step after bringing the vegetables & fruits

From the results we can state that 65.33% respondents Clean vegetables and wash hands simultaneously.

Which disinfectant or aseptic method easy

As can be seen in the Table 38.10 % respondent's finds easy to wash with Water having salt/vinegar and 29.93 % finds washing with Normal Water / running water.

Do you find easy and safe to wash vegetables and fruits using the chemical disinfectants available in the market?

47.06 % respondents gave affirmative answer.

Health problems like nausea, vomiting and abdominal pain can occur if we intake chemically cleaned fruits and vegetables

Even 47.06 % respondents gave affirmative answer in the response to the question- Do you find easy and safe to wash vegetables and fruits using the chemical disinfectants available in the market? But 75.21% were aware that Health problems like nausea, vomiting and abdominal pain can occur if we intake chemically cleaned fruits and vegetables.

According to WHO and FDA what is the best way to clean the fruits and vegetables

As can be seen in the table only 46.61% respondents know that washing raw fruits and vegetables with Normal Water/running water is sufficient amid corona.

Do you think UV light can kill corona virus from fruits and vegetables

23.53% respondents said yes that they think UV light can kill corona virus from fruits and vegetables. UV radiations are normally used to kill microorganisms. Particularly, UV-C, also known as Ultraviolet germicidal irradiation (UVGI) is a disinfection method that uses short-wavelength ultraviolet light to kill or inactivate microorganisms by destroying their nucleic acids and disrupting their DNA, leaving them unable to perform vital cellular functions and stops their replication. UVGI is used in a variety of applications, such as food, air, and water disinfection. Few research studies have found that UVC radiation is also effective in killing coronaviruses on various surfaces, but efficiency is variable for different kinds of surfaces depending on their texture [6].

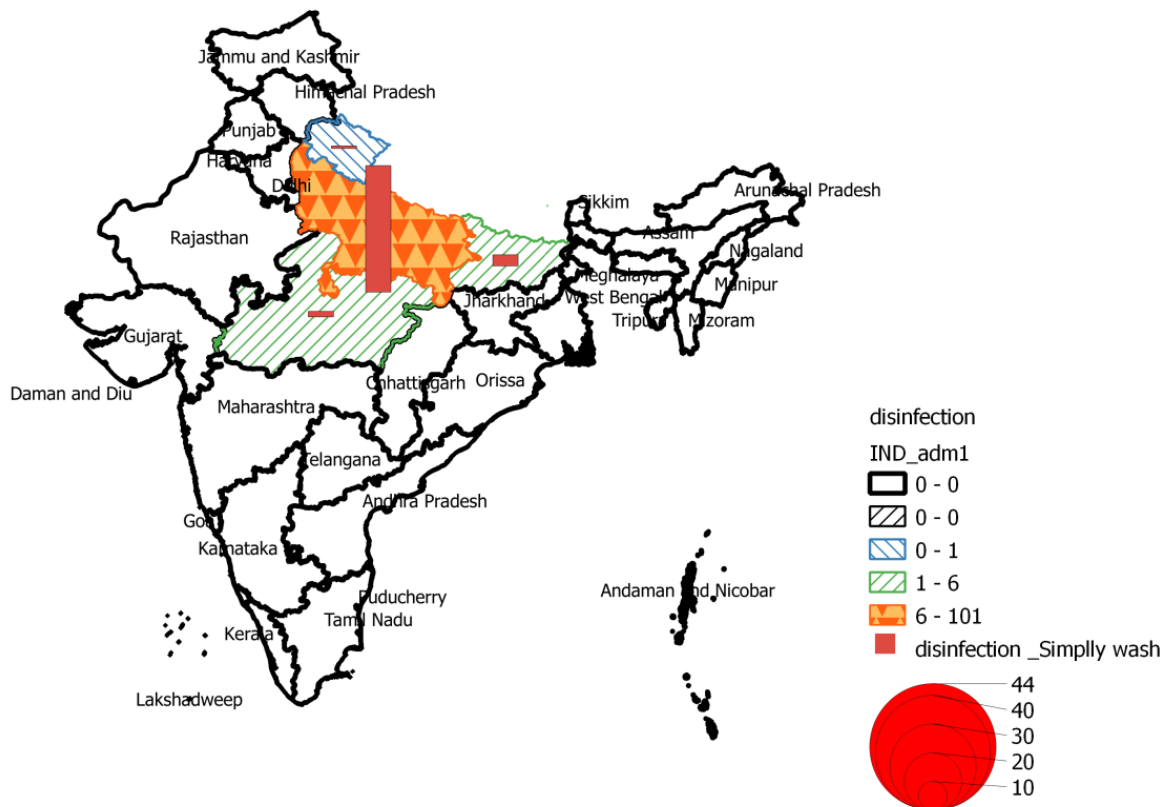


Figure Choropleth Map: showing home states of respondents and frequency histogram legend for answer to the question- According to WHO what is the best way to clean the fruits and vegetables?

GIS Choropleth mapping with FHL

As we can clearly state from choropleth map that majority of respondents belong to U.P. The respondent's perceptions and knowledge about the right practice of fruits and vegetable washing and disinfection differ as per their level of education as very less number of respondents was aware about WHO guidelines.

Conclusion

By and large the respondents represented homogenous group of unmarried north Indian young generation of middle income group, they were vocal about their pattern of fruits and vegetable disinfection amid corona. Washing and disinfection of fruits and vegetables pattern of majority of them was affected due to pandemic. The respondent's perceptions and knowledge about the right practice of fruits and vegetable washing and disinfection differ as per their level of education. It is noteworthy to mention that the even young graduation pursuers have confusion about it, so government should work on their rumor breaking system in any unprecedented times.

Future Scope

As washing of fruits and vegetables is an important step to keep fruits and vegetables safe, nutritious, and fresh like produce, a number of disinfection technologies have been developed.

- The chemical treatment, including chlorine, ozone, electrolyzed water, essential oils have been improved as alternatives to traditional disinfection methods to meet current safety standards.
- Non-thermal physical treatments such as UV light, pulsed light, ionizing radiation, cold plasma have shown significant advantages in improving microbial safety and maintaining the desirable quality of produce.
- Nowadays organic based disinfection are used for washing fruits and vegetables to meet the requirement of food safety.
- Several hurdle technologies have been developed, which achieved synergistic effects to maximize lethality against microorganisms.

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