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Household Willingness To Accept Waste Cooking Oil Collection And Recycling In Hyderabad, India

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Abstract
Waste Cooking Oil disposal is an unaddressed problem result's in affecting environment and health, leading to municipal costs. Therefore, there is a need for collection and recycling of WCO. This study employed Contingent Valuation Method for investigating household participation and their Willingness To Accept WCO collection and recycling using 6 bid prices. Data were collected from 312 households. Employed Fisher's Exact Test and Binary Logistic Regression to test associations and influence of independent and dependent variables. Policy and programs should be developed by the government to address improper WCO disposal practices and promote WCO collection and recycling.
Key words: *Waste Cooking Oil (WCO), Willingness To Accept (WTA), Contingent Valuation Method (CVM), Disposal practices, Used Cooking Oil (UCO).*

1.1 INTRODUCTION

Waste management is becoming the biggest challenge to the world. (Sperandio et al., 2019) Growing population, industrialisation, capitalisation are increasing day by day, hence creating pressure on the environment. There is an inevitable increase in the aggregate wastes produced which causes a threat not only to human health but also to the environment. The only way to subside the threat is recycling the waste. (Afroz et al., 2009; Gurbuz & Ozkan, 2019) Some wastes like paper, PVC, plastics are being recycled instead of disposing them off in the landfill which acts as a great idea. Among these recycled products WCO recycling has also become a trend. (Sperandio et al., 2019) In the first few decades of the 20th century, certain developed countries like the United States, Germany, Japan, Taiwan, EU etc have identified problems with WCO disposal and reuse. (Kabir et al., 2014a; Yang & Shan, 2021) Therefore, these countries had enacted some legal provisions regarding food safety parameters throughout their nations and could successfully resolve this problem in a short period of time with their citizens' cooperation. (Lee et al., 2023; Yang & Shan, 2021)

WCO is a leftover liquid residue after deep frying food in cooking oil generated by household, street food vendors, restaurants, caterers, industrial kitchens etc. (Yacob et al., 2015) It is recommended to replace cooking oil after one to two uses, if UCO is used more than twice it will release FFAs (Free Fatty Acids) content making the food fried in repeatedly heated cooking oil not be suitable for consumption. Valorisation of UCO is the best option to address this situation. (Febijanto et al., 2023) Previous studies revealed the health and environmental effects of WCO re-use and disposal. (Yacob et al., 2015) The role of municipal waste management is crucial for protecting public health and the environment from the waste being disposed of. (Afroz et al., 2009) How different wastes are collected separately like biodegradable wastes, plastic waste, e-waste etc, in the same way WCO must also be collected separately for its effective utilisation thereby reducing load on the environment. (Lee et al., 2023)

It is noteworthy that the majority of household fat waste is disposed directly in drainage or in garbage at municipal wastes (Matušinec et al., 2022) which has a high impact on the environment. (Hidalgo-Crespo et al., 2022) Dumping wastes in landfills is not an eco-friendly option as it increases environmental footprints resulting in the emission of greenhouse gases. (Sperandio et al., 2019; Xirogiannopoulou & Athanasiou, 2025) Inappropriate disposal and re-use practices of WCO gives adverse effect to humans as well as the environment, there is a need for proper management of WCO. (Hartini et al., 2019; Thi et al., 2024) WCO which is steeped in water not only threatens aquatic life but in due course this contaminated water will be consumed by aquatic-life acts as a poison, which will reach humans through the food chain. (Kabir et al., 2014b) Uncontrolled WCO disposal practices create economic loss. (De Feo et al., 2020; Xirogiannopoulou & Athanasiou, 2025) Captivating improper WCO disposal not only prevents groundwater contamination but also helps in extending product life cycle. (De Feo et al., 2020) The concept of a circular economy focuses on preventing waste from being disposed of in landfill through recycling them. Thus, in order to reduce losses, the value of materials should be captured. (Hidalgo-Crespo et al., 2022) In the circular economy (CE) the last phase is recycling, this says the material which cannot be reused, maintained, or remanufactured must be recycled. (Lee et al., 2023) UCO is one of the sources which is renewable, available at low-budget, and can be used to produce many kinds of products. (Hidalgo-Crespo et al., 2022) Recycling waste fats into biodiesel becomes one of the brilliant solutions to protect the environment, minimise waste, controls fossil fuel usage, brace energy security and to achieve a circular economy. (Lee et al., 2024; Matušinec et al., 2022)

The main purpose of sustainable development goals (SDG) is to protect and safeguard water, earth and ecosystem. (Kamaruzaman et al., 2022) In order to fight climatic changes, in line with global initiatives it is mandatory to incorporate sustainable approaches. This transformation of waste into value-added products not only gives the entrepreneur's economic benefits but also to the government and the public. (Xirogiannopoulou & Athanasiou, 2025)

WCO collection and recycling targets to cut down infrastructural, health and environmental effects. (Yacob et al., 2015) There is a good potential market for conversion of WCO into biofuel with technical feasibility and economic viability. Despite its demand for biofuel production, supply of WCO is relatively low. (Lee et al., 2023; Liu et al., 2018; Yang & Shan, 2021)

As a part of the Paris agreement, by the year 2050 all nations are working to achieve carbon neutrality. In October 2022 International Civil Aviation Organization set a goal to remove carbon dioxide emitted from international flights by the year 2050. Using WCO for producing Sustainable Aviation Fuel (SAF) is the process which is being used currently, which leads to increase in price of WCO. (Lee et al., 2024) Supportive policies in UCO recycling have been increased in Europe, Germany in particular. Based on the goal set by the International Civil Aviation Organization (ICAO) in eliminating emissions of carbon dioxide by 2050 from international air travel there is a drastic rise in demand for UCO. (Lee et al., 2023)

Commercial facilitates of UCO includes industrial paints, soaps, biodegradable polyurethane sheets, aromatic candles, feed production, alkyd resins, bio lubricants, bioethanol, biodiesel, Aviation fuel, animal feed, lubricants and greases (Azme et al., 2023; Fitriana Kaban et al., 2024; Joshi et al., 2011; Lee et al., 2023; Manikandan et al., 2023; Manoj Madhukar et al., 2023; Moecke et al., 2016; Mohd Zaroul Afiq Mohd Zol & Anika Zafiah Mohd Rus, 2023; Novembrianto et al., 2024; Rahayu et al., 2021; Talens Peiró et al., 2010; Teixeira et al., 2018), green agricultural pesticides, (Iqbal et al., 2021) Asphalt (used in laying roads) (Ahmed & Hossain, 2020), Sustainable Aviation Fuel (SAF) (Lee et al., 2023)

The first phase in creating sustainable supply chain management of WCO recovery is to identify habits, needs, beliefs of the community. (Hartini et al., 2019; Xirogiannopoulou & Athanasiou, 2025) The collection system of UCO for households needs support from local governments. (Febijanto et al., 2023) Almost all the countries succeeded in collecting solid waste but collecting liquid waste became a challenge. Hence collection of liquid wastes needs special attention which requires a proper planning system. Some countries addressed this problem by strictly collecting waste liquid fats from commercial as well as households through municipalities. Even though there are many studies in which researchers negotiate supply chains in managing WCO, there are many theoretical and practical challenges to collect WCO which says that the literature available is insufficient to solve the problem of WCO collection. (Matušinec et al., 2022)

UCO can be collected from two sources one is Household and the other is HORECA (HOtels,REstaurants,CAtering/CAfe). (Febijanto et al., 2023; Hartini et al., 2019) Collection of WCO from households is ascertained with huge costs like logistics cost, social costs and industrial costs. (Sperandio et al., 2019) One most effective and sustainable WCO collection method is third-party recyclers who pay some price to restaurants on each litre of WCO collected from them. (Liu et al., 2018) There is a necessity for the involvement of households in effective management of UCO. (Xirogiannopoulou & Athanasiou, 2025)

The most used WCO collection methods in the EU are proximity collection and door-to-door collection in which there will not be any cross checks for the liquid waste being disposed of. Therefore, there may be the chances of collecting other liquid wastes apart from UCO which will spoil the authenticity of WCO for recycling and also creating extra cost for the recyclers for filtering other liquid wastes from WCO or in some cases if the WCO is contaminated it will be disposed of. (Sperandio et al., 2019) A few countries have a good network of WCO collection bins where some counties collection yards are far from citizens' walking distance which discourages people to take time and reach those waste fat collection yards, hence leading to disposal at drainage as this kind of disposal cannot be identified. (Matušinec et al., 2022)

This study applies the Contingent Valuation Method (CVM), to examine public perceptions. Regardless of the criticisms in CVM, it produces trustworthy and accurate results which are consistent and applicable with microeconomic theory. (Cho et al., 2015) This method is used to create a hypothetical situation for non-market goods through which Consumers' Willingness To Accept (WTA) (Cho et al., 2015; Yacob et al., 2015) and Consumers' Willingness To Pay (WTP) can be estimated. (Afroz et al., 2009) CVM is proven as a straightforward technique for evaluating opinions of the public on specific non-market goods. (Afroz et al., 2009; Cho et al., 2015; Yacob et al., 2015) The aim of this study is to identify factors influencing household WTA WCO collection.

2.1 MATERIALS AND METHODS

2.1.1 Study area:

This study applied Contingent Valuation Method (CVM), for identifying Willingness to Accept (WTA) Waste Cooking Oil (WCO) collection in four districts of Hyderabad, Telangana, India. Hyderabad is the most populated metropolitan city in south states Andra Pradesh and Telangana with approximately 1,13,38,000 population. (*Hyderabad, India Metro Area Population (1950-2025) | MacroTrends*, n.d.) The four districts of Hyderabad include Ranga Reddy, Sangareddy, Medchal-Malkajgiri and Hyderabad. (*Hyderabad - Wikipedia*, n.d.) Total household population is 9,77,000. (*Economy | Hyderabad District, Government of Telangana | India*, n.d.)

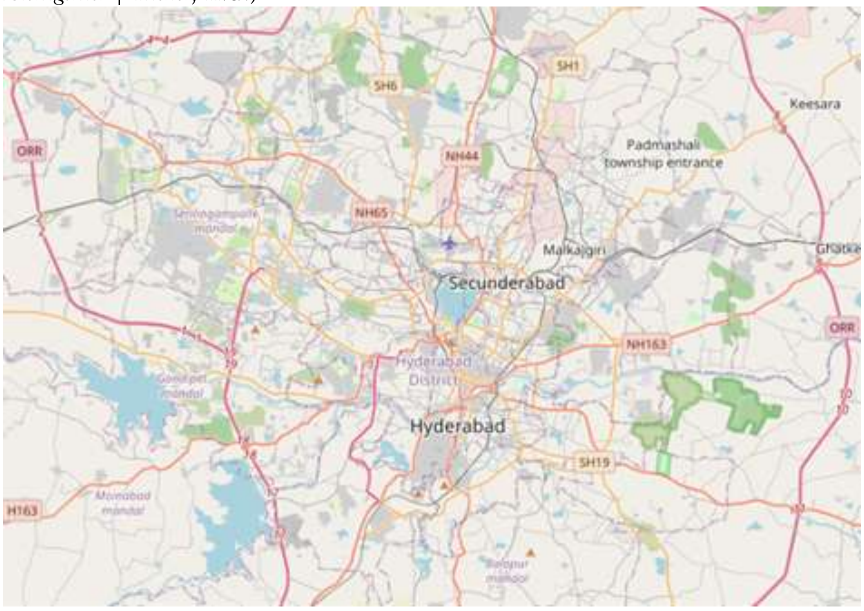

Figure 1: Map of Hyderabad, Telangana, India (*File:Hyderabad OpenStreetMap.Svg - Wikipedia*, n.d.)

2.1.2 Sampling and Data collection:

A cross-sectional survey was conducted to identify household disposal practices and their willingness to participate in WCO collection. This study used exploratory and descriptive statistics. Data was collected from 312 respondents in the tenure of 26th April 2025 to 23rd June 2025, using quota sampling techniques in four districts of Hyderabad. A structured questionnaire is used and data is collected using face-to-face and telephonic interview methods from households in Hyderabad. The questionnaire consists of four sections like socio-demographics (age, gender education, district, family size, monthly household income), cooking oil behaviour (cooking oil type, consumption in ml, disposal, disposal source), Awareness on WCO recycling, household WTA (Willingness To Accept) WCO (Waste Cooking Oil) collection using 6 bid prices in a price ladder. (shown in figure 2). Multi-Bounded Dichotomous Choice (MBDC) questions with skip logic are used to identify respondents WTA WCO collection using 6 bid prices (Rupees 0(free),20,25,30,35,40) (Cho et al., 2015)

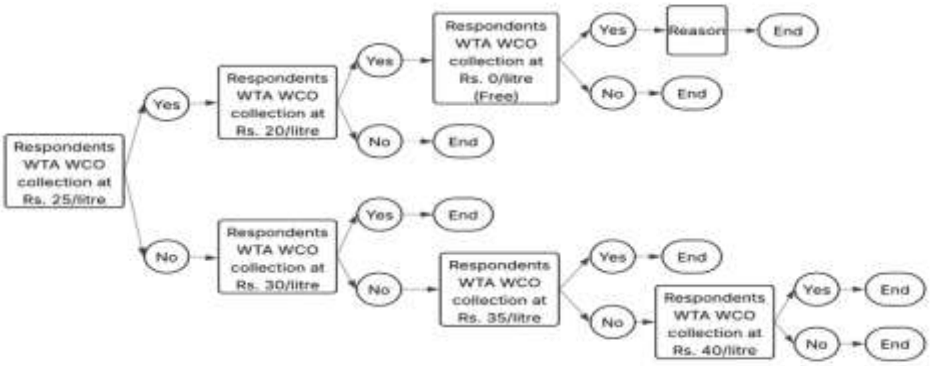

Figure 2: WTA WCO collection using price ladder format (*Questionnaire Format: Lucidchart*, n.d.)

2.1.3 Data Analysis:

This study employed SPSS for data analysis. Descriptive statistics were used to explain respondents' socio-demographics, followed by Pearson Chi-square test and Fisher's Exact Test to test the hypotheses by identifying associations between the independent and dependent variables. Binary Logistic Regression analysis is used to test the influence of independent variables on dependent variables.

2.1.4 Research Hypothesis:

H1: 'WCO disposal (in ml)' is significantly associated with 'WTA WCO collection'.
H2: 'Source of disposal' is significantly associated with 'WTA WCO collection'.
H3: 'Minimum WTA (per litre)' is significantly associated with 'WTA WCO collection'.
H4: 'Monthly consumption of cooking oil' is significantly associated with 'WTA WCO collection'.

3.1 DATA ANALYSIS AND INTERPRETATION

Table 1: Crosstabulation Between Variables

Variables	Pearson Chi-Square Test	Fisher's Exact Test	P-Value For Both Tests
Wta Wco Collection And Wco Disposal (In Ml)	38.616	23.888	0.000
Wta Wco Collection And Source Of Disposal	37.809	22.909	0.000
Wta Wco Collection And Minimum Wta (Per Liter In Rs.)	312.000	113.529	0.000
Wta Wco Collection And Monthly Oil Consumption	1.095	1.760	0.806, 1.000
Number Of Valid Cases		312	

Most of the cells (more than 20%) have expected cell count less than 5, which says Pearson chi-square test is not reliable even though p-value is less than 0.001. Therefore, Fisher's Exact Test based on Monte Carlo is used to test relationships between variables. This test uses a simulation of 10,000 random tables.

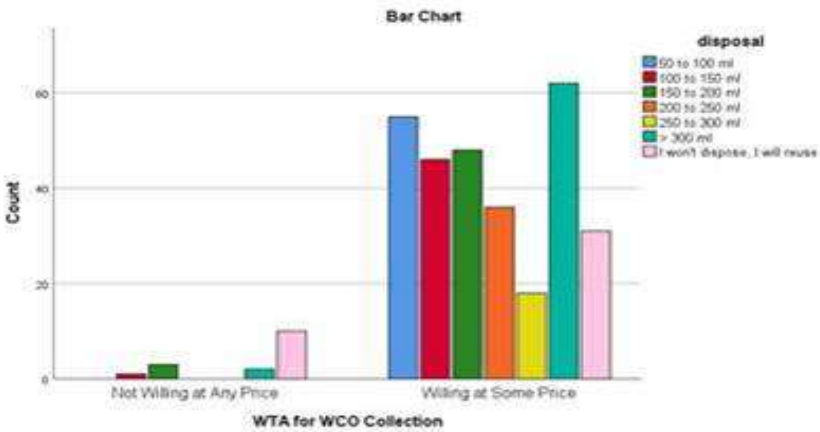

Figure 3: Relationship between WTA WCO collection and WCO disposal

Pearson chi-square test showed <0.001 significance between WTA WCO COLLECTION AND WCO

DISPOSAL (in ml) with χ^2= 38.616. Due to the presence of low expected frequencies in many cells Fisher's Exact Test was conducted to test the results, this test showed χ^2= 23.888 and p-value >0.001 confirming association between the two variables. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. These results indicate a robust and statistically significant relationship between the variables. With respect to change in quantity of WCO disposed by the respondent, there is also a change in respondents WTA WCO collection, suggesting that both these variables are dependent on each other.

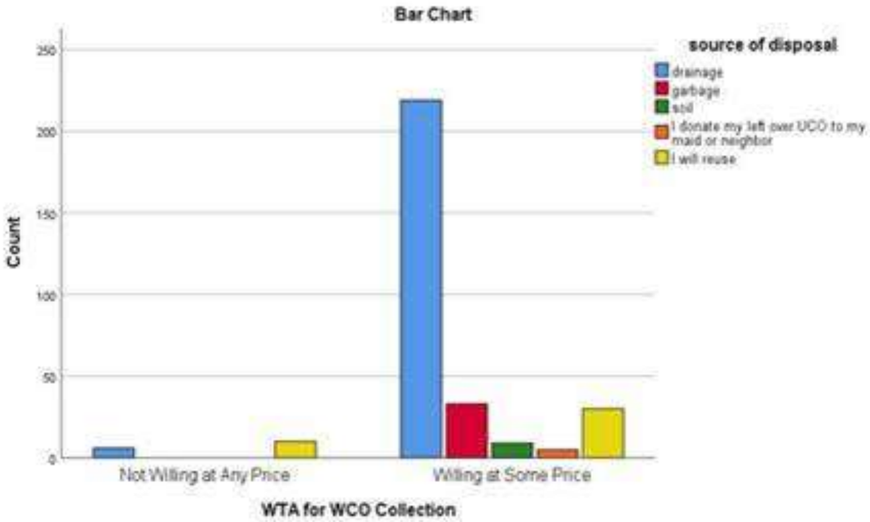

Figure 4: Relationship between WTA WCO collection and source of disposal

Wta Wco Collection and Source of Disposal are not independent variables as Pearson chi-square test results χ^2=37.809 and Fisher's Exact TEST results χ^2=22.909 both are showing statistically significant relationship <0.001, we reject null hypothesis and accept alternate hypothesis. The respondents who are using Unsafe WCO disposal practices (drainage, garbage. Soils, donation to maid) are more likely to participate and show WTA WCO collection.

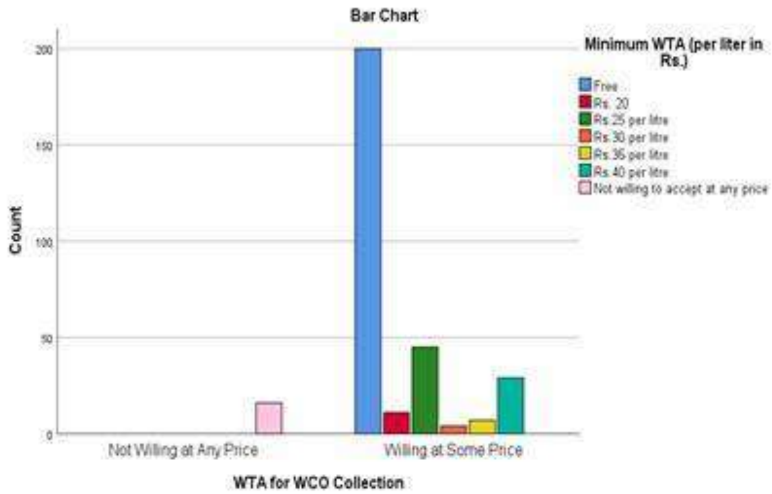

Figure 5: Relationship between WTA WCO collection and Minimum WTA

Wta Wco Collection And **Minimum Wta (Per Liter In Rs.)** are the variables used in Pearson Chi-square test (χ^2=312.000) and Fisher's Exact Test (χ^2=113.000). Both the tests showed a strong statistically significant (p-value<0.001) relationship which helps in stating that these variables have strong relationships with each other. Hence this helps in accepting alternate hypothesis by rejecting null hypothesis. **MINIMUM WTA (PER LITER IN RS.)** is a variable created in SPSS to identify respondent's lowest opted bid price from the price ladder (given in questionnaire) to participate in WCO collection. (refer to figure 5 and figure 2). The respondents who choose any bid price (free, 20,25,30,35,40 rupees) are more interested in participating in WCO collection than the respondents who choose not willing to accept at any price. (Table 1)

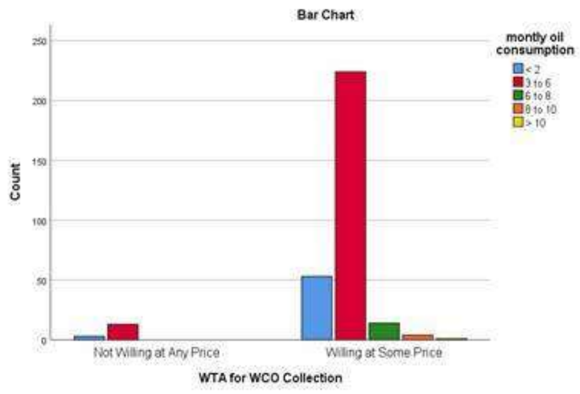

Figure 6: Relationship between WTA WCO collection and monthly cooking oil consumption

Pearson Chi-Square Test (p-value=0.806) and Fisher's exact Test (p-value=1.000) are not showing significant association between WTA WCO COLLECTION AND MONTHLY OIL CONSUMPTION. This test confirms that both the variables are independent, since there is no statistical significance, we fail to reject null hypothesis. Respondents' amount of consumption of cooking oil is not dependent on their WTA WCO collection. (Table 1)

Table 2: Model Fit and Overall Significance

TEST	χ^2	df	p-value
Omnibus Tests of Model Coefficients	20.444	1	.000
Hosmer and Lemeshow Test	3.057	1	.080

Omnibus Test of Model Coefficients is statistically significant ($p<0.001$), indicating that the model provides significantly better fit with predictors than without predictors. The independent variable 'source of disposal' contributes meaningfully to predict the dependent variable 'WTA WCO collection'. (Table 2)

Hosmer and Lemeshow Test statistically indicates a good fit ($p>0.005$), which indicates the model predicted probabilities that match the observed outcomes. In other words, it says that there is no difference between observed and predicted variables. (Table 2)

Table 3: Model Summary

Statistics	Value
-2 Log Likelihood	105.775
Cox & Snell R Square	0.063
Nagelkerke R Square	0.191

Nagelkerke R^2 is 0.191 is a moderate effect size in social sciences. This shows 19% variance in dependent variables. This means change in source of WCO disposal can be accounted for by participation in WCO collection. (Table 3)

Table 4: Classification Accuracy

Category	Accuracy
Not Willing At Any Price (Predicted)	0.0
Willing At Some Price	100.0
Overall Classification	94.9

This model accurately classified 100% of respondents (n=296) who has WTA WCO collection at some price or for free. How ever this model failed to predict the respondents who do not have WTA WCO collection at any price (n=16) (Table 4)

Table 5: Regression Coefficient (Exp(B)) And Significance

Predictor	B	S.E.	P-Value	Exp(B)	95% Ci For Exp(B)	Interpretation
Source Of Disposal	-0.524	0.116	0.000	0.592	0.471	0.743
Constant	4.385	0.525	0.000	80.212	-	-

The independent variable source of disposal significantly predicts WTA WCO collection ($p<0.001$). the model correctly classified 100% of cases, it predicts that a respondent would show WTA WCO collection. (Table 5)

The coefficient B=-0.524 indicates a negative relationship between source of disposal and WTA WCO collection. (Table 5)

Standard Error (SE= 20.347) with p-value <0.001 confirms a significant statistical relationship. (Table 5)

The odds ratio Exp(B)=0.592 predicts that respondents who are using unsafe disposal practices are 40.8% likely to participate in WTA WCO collection when compared to the respondents who practice safe disposal practices. (Table 5)

95% of the confidence interval (0.471-0.743) does not include 1, this also confirms direction of effect as well as statistical significance. (Table 5)

4.1 DISCUSSION

This study aimed to identify respondent's WTA WCO collection in Hyderabad. Findings revealed that 'WCO disposal (in ml)', 'source of disposal' and 'Minimum WTA (per litre in rupees)' showed statistically significant associations with 'WTA WCO collection'. It means that the respondents who are disposing large or medium amounts of WCO in drainage or garbage or soil, the respondents who opted any amount of price in the price ladder (given) are more likely to give their WTA WCO collection. 'Monthly cooking oil consumption' didn't show statistical significance with 'WTA WCO collection'; it means that the respondents' level of cooking oil consumption does not matter in their participation in WCO collection. Because the respondent who is consuming small amounts of cooking oil per month can show their WTA WCO collection while the respondent who is consuming large amounts of cooking oil per month may not have WTA WCO collection as they might reuse cooking oil instead of participating in WCO collection.

Binary logistic regression analysis confirmed that the independent variable 'source of WCO collection' is influencing the dependent variable 'WTA WCO collection'. 76.91% of the respondents are using refined oil. 72.1% of respondents are disposing their WCO in drainages followed by 10.6% in garbage, 2.9 % in soil, 1.6% respondents said that they will donate their left-over UCO to their maids, while 12.8 % respondents are reusing their UCO without disposing. As discussed by (Matušinec et al., 2022) discarding oil in drainage is one of the main reasons for sewage problems. It is noted that 87.2% of respondents are using environmentally hazardous ways of disposal. One respondent said that she will consume left-over residue of WCO which contains food scraps by mixing it in rice, especially she said their family will consume WCO reside left-over after deep frying chicken or fish, whereas the other respondent is aware of negative health effects of WCO therefore she will not consume it but will mix that reside of WCO in rice and feed this WCO mixed rice to street dogs. Previous studies had revealed many health problems which will occur by consuming food fried in waste cooking oil regularly. These health effects include cancer, cardiovascular diseases, growth retardation, cellular damages, gene alteration, liver problems, cholesterol, gastrointestinal problems, dietary contaminations, neurological problems, reproductive disorders and so on. (A et al., 2022; Emelike N.J.T et al., 2020; J.H. Potgieter et al., 2004; Mishra et al., 2023; Perumalla Venkata & Subramanyam, 2016; Rajendran et al., 2022; Savitha T & Keerthana Thangavel, 2022; Soni et al., 2024; Szabo et al., 2022) While the other respondent said she will dispose of their leftover WCO in the garden, thinking that this WCO will act as a fertilizer to plants. But on the contrary Olu-Arotiowa et al, 2022 mentioned in their research regarding the soil pollution caused by WCO disposal, with disposal of WCO poisonous toxics will be released in the soil there by losing its fertility. If waste cooking oil is dumped in soil in large quantities there is also a chance of water pollution as this WCO disposed of in soil will penetrate into ground water there by polluting it. (A et al., 2022) Inappropriate disposal practices will negatively affect environment by clogging drainages, further damaging municipal sewers, also creates backwash leading to flooded drainage, (A et al., 2022; Balaria et al., 2021; Soni et al., 2024) further leading to economic loss to the government by effecting environment and thereby society. (Nieuwenhuis et al., 2018) This disposal of WCO in drainage is commonly practiced disposal method in Hyderabad not only by household but also by the food business operation (findings from survey which I did earlier to this article) (Sushmitha et al, unpublished, 2024), which creates major problem in Hyderabad. At the time of rains most of the drains get clogged and water will overflow from the drainage, to control overflow of rain water from clogged drains, the manholes will be opened so that water can flow directly into the manhole. This unclosed manholes further causing problems to the public who pass by as the rain water creates a pool which will hide manholes becoming threat to the public who pass by as they cannot find the manhole in rainwater pool. 88.1% of respondents said that they are not aware of WCO recycling. 94.2% of respondents accepted that they had never heard of WCO recycling. Even though 52.9% of respondents are aware of environmental effects caused by WCO disposal, they are following unsafe WCO disposal practices as there is no availability of recyclers who collect WCO from households. While 47.1% of respondents don't know the environmental effects of following unsafe disposal methods. Therefore, there is a need for public awareness programs on safe WCO disposal practices. This aligns with previous studies in which the researchers (Kabir et al., 2014a) suggested that there is a need for a public awareness program to create awareness regarding effects of reusing UCO more than thrice, effects of improper disposal, and thereby encouraging recycling. There is also a need for separate WCO collection from households in line with other study by (Emara et al., 2018) in which the research also noted that there should be the involvement of the government as well as the investors for collecting WCO as raw materials for renewable fuels. There is a scope for entrepreneurs to avail this opportunity by recycling WCO into value added products. Not only this, there is also huge scope for supply chain networks and logistics as WCO collected can be exported to European countries to fulfil their demand. As mentioned by Lee et al,2023 International Civil Aviation Organization planned to manufacture Sustainable Aviation Fuel (SAF) made of WCO as a part of Paris agreement, aiming to use SAF in all countries. (Lee et al., 2023) There is a massive demand for WCO in the European Union. As per the research of Kristiana et al,2022 even if the WCO is collected from household and commercial outlets from 6 major countries in Asia like India, Japan, China, Malaysia, Republic of Korea, Indonesia are insufficient as per the demand of RED II (renewable Energy Directives). (Kristiana et al., 2022)

Considering low rates of proper WCO disposal, there is a need for the designing of convenient and accessible WCO collection systems from households by adapting one of the methods of WCO collection bins followed by government and public in developed countries. In a study by Matusine et al, 2022 the researchers had presented a mathematical model for collecting fat wastes using bins to many nearby locations in municipalities especially at household vicinity. The researcher's aim is to provide waste bins to all the citizens in their walking distance to dispose of fat waste at the same time minimising the collection points count to reduce cost of collecting fats in Czechia (Country in Europe), (Matušinec et al., 2022) and Gomes et. al., 2024 proposed a smart solution based on IoT used to collect domestic UCO in the form of bins and named it as SWAN (Smart Waste Accumulation Network), in Portugal. This is a network of smart bins made available in public areas in the country. SWAN came up with a customised edge-computing framework equipped for municipalities with a smart city blended network of bins to collect WCO. There is a need to recycle UCO to protect the environment from disposal of WCO. (Gomes et al., 2024) In Italy there is an innovative and eco-friendly solution for the disposal of WCO named 'GreenBag' in which there will be three essential elements.

1. **Analysis Box:** This box contains a tank which has 5 litres capacity with electric lock, which can be unlocked with a pre-registered card. This box also contains active carbon filters to subside the smell released from the liquid wastes; it is equipped with numerous sensors which can identify what kind of liquid waste has been disposed of in it. Two electro valves which are controlled using a microcontroller are connected at the bottom of this analysis box with two separate tanks, one tank is for segregating UCO and other tank is for segregating scrap. sensors will detect WCO and other liquid waste apart from WCO (scrap) and send the information to the microcontroller which will then release the respective electro valves to separate collection of WCO in one tank and the scrap in another tank.
2. **UCO Tank:** This is a metal tank which has the capacity of 100 Liters connected with wheels at the bottom of the tank for easy movement and collection, it is also fitted with handles for compatibility in handling the tank while emptying. It comes with an ultrasound sensor which helps in measuring the level of liquid being filled in the tank.
3. **Scrap Tank:** This tank has the capacity of 40 litres, which also have ultrasound sensors similar to UCO tank to check the level of liquid, fitted with 4 wheels for easy movement. (Sperandio et al., 2019)

Despite useful insights, this study has certain limitations. As this is academic research, the survey is done by one researcher. Due to time constraint the sample taken is limited to 317 responses from personal interview which is less sample with population size. The other limitation includes in one question posed to the respondents regarding their WCO disposal, for the convenience of analysis a predetermined options were assigned to the question and based on the amount of leftover WCO of respondent an option which falls in that range is been selected, this becomes a limitation because at the time of calculation on amount of WCO disposed by the respondents there is no exact amount to be calculated. Therefore, midpoints and frequencies are used to calculate the total amount of WCO disposed by all the respondents which is a presumed value but not exact value.

This research has a huge future scope in which the researchers can deploy WCO collection bins, supply chain networks. Researchers can also expand it to commercial settings. Can extend the research with large sample size and other geographical areas.

5.1 CONCLUSION

This study used a contingent valuation method (CVM) to estimate household Willingness to Accept (WTA) waste cooking oil (WCO) collection in Hyderabad city, India, with an incentive provided using price ladder and skip logic questions. The results revealed that the majority of households showed WTA WCO collection with and without incentive. Even though Hyderabad is a metropolitan city it does not have a separate WCO collection system. Previous studies revealed health and environmental effects on reuse and disposal of WCO. There is a huge potential for WCO recycling which not only helps in protecting the environment by discouraging unsafe disposal practices but also gives economic benefits to the entrepreneurs and the public in exchange of this non market goods (WCO). As highlighted earlier, WCO can be converted into aromatic candles, soaps, biodiesel, polyurethane sheets, grease and lubricants etc. The findings of this research states that household WTA WCO collection is favourable to entrepreneurs, as this gives an opportunity for creating effort for WCO recycled products. Integrating sustainable production of WCO recycled products and support from households in participating WCO collection gives mutual benefits. This not only encourages entrepreneurship, supply chain networks, logistics but also protects the environment from waste being disposed of. This research suggests policy makers and the government implement a separate WCO collection mechanism as there is household WTA WCO collection. This research also suggests a strong need for awareness campaigns for the public on safe disposal practices of WCO, health and environmental effects of food fried in repeatedly heated cooking oil. It is high time for the government and policy makers to adapt this research for taking necessary actions.

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APPENDECIES

Table 6: Respondent's Average WCO disposal per month

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	41	13.1	13.1	13.1
	75	55	17.6	17.6	30.8
	125	47	15.0	15.1	45.8
	175	51	16.3	16.3	62.2
	225	36	11.5	11.5	73.7
	275	18	5.8	5.8	79.5
	375	64	20.4	20.5	100.0
	Total	312	99.7	100.0	
Missing	System	1	.3		
Total		313	100.0		

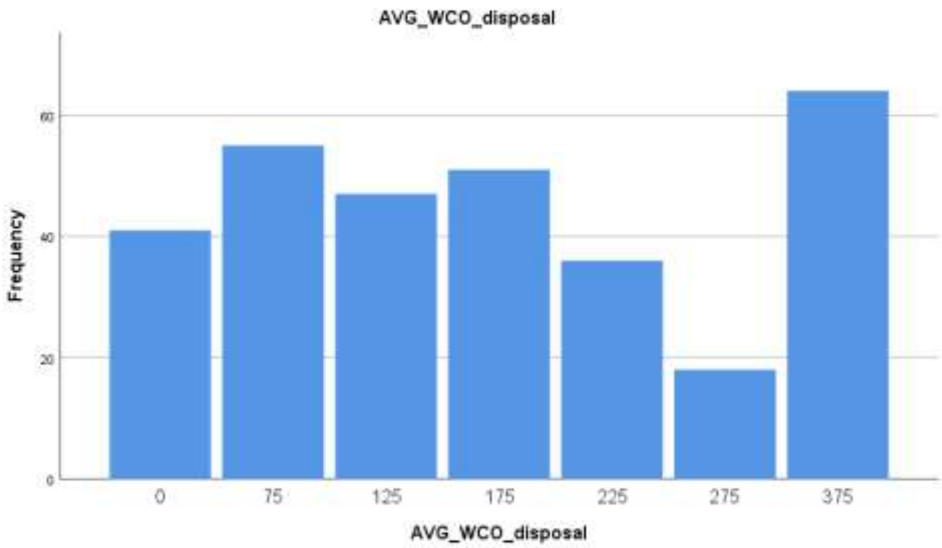

Figure 7: Respondent's **Average WCO disposal per month**