



PAKISTAN



SCOPING STUDY FOR PET WASTE MANAGEMENT IN PAKISTAN



A baseline study across 10 cities of Pakistan to understand the
PET (Polyethylene Terephthalate) waste management cycle

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TABLE OF CONTENTS

| | |
|---|-----------|
| 1. STUDY BACKGROUND | 1 |
| 2. INTRODUCTION | 4 |
| 2.1 WHAT IS PET? | 4 |
| 2.2 GLOBAL SCENARIO | 4 |
| 2.3 SCENARIO IN PAKISTAN | 5 |
| 2.4 IMPACT OF PLASTIC POLLUTION ON THE MARINE ENVIRONMENT | 5 |
| 2.5 LAND-BASED IMPACTS OF PLASTIC POLLUTION | 6 |
| 2.6 PLASTIC LEGISLATION IN PAKISTAN | 6 |
| 2.6.1 PUNJAB | 6 |
| 2.6.2 SINDH | 6 |
| 2.6.3 KHYBER PAKHTUNKHWA | 6 |
| 2.6.4 BALOCHISTAN | 7 |
| 2.7 CURRENT SUPPLY CHAIN OF PET BOTTLES IN PAKISTAN | 7 |
| 2.7.1 PET MANUFACTURING & DISTRIBUTION | 7 |
| 2.7.2 PUBLIC & PRIVATE WASTE MANAGEMENT COMPANIES | 8 |
| 2.7.3 POST-CONSUMER USE / INFORMAL RECYCLING | 8 |
| 2.7.4 SCAVENGERS / WASTE PICKERS | 9 |
| 2.7.4.1 CHILD LABOUR | 9 |
| 2.7.5 JUNK /SCRAP DEALERS | 9 |
| 2.7.6 RECYCLERS / PROCESSORS | 10 |
| 2.8 CITY PROFILES | 10 |
| 2.8.1 KARACHI | 10 |
| 2.8.2 LAHORE | 11 |
| 2.8.3 ISLAMABAD | 11 |
| 2.8.4 PESHAWAR | 11 |
| 2.8.5 FAISALABAD | 12 |
| 2.8.6 GUJRANWALA | 12 |
| 2.8.7 MULTAN | 12 |
| 2.8.8 MURREE | 12 |
| 2.8.9 RAHIM YAR KHAN | 13 |
| 2.8.10 GILGIT | 13 |
| 2.9 RATIONALE | 13 |
| 2.10 STUDY OBJECTIVES | 14 |
| 3. STUDY METHODOLOGY | 16 |
| 3.1 DEFINING THE SCOPE | 16 |
| 3.2 SAMPLING TECHNIQUES ADOPTED | 17 |
| 3.2.1 JUDGMENT OR PURPOSIVE SAMPLING | 17 |
| 3.2.2 CONVENIENCE SAMPLING | 18 |
| 3.3 RESEARCH METHODS | 18 |

| | |
|--|-----------|
| 3.3.1 QUESTIONNAIRES | 19 |
| 3.3.2 INTERVIEWS | 19 |
| 3.4 ESTABLISHING CONTACT WITH STAKEHOLDERS FOR SURVEY FACILITATION | 20 |
| 3.5 DATA ANALYSIS | 20 |
| 3.5.1 MARKING GPS COORDINATES | 20 |
| 3.5.2 MAPPING GIS COORDINATES | 20 |
| 3.5.3 ANALYSIS ON SPSS | 20 |
| 4. SURVEY FACILITATION | 22 |
| 4.1 SINDH SOLID WASTE MANAGEMENT KARACHI (SSWM) | 22 |
| 4.2 WATER AND SANITATION SERVICES PESHAWAR (WSSP) | 22 |
| 4.3 GUJRANWALA WASTE MANAGEMENT COMPANY (GWMC) | 22 |
| 4.4 ALBAYRAK WASTE MANAGEMENT COMPANY, MURREE | 23 |
| 4.5 LAHORE WASTE MANAGEMENT COMPANY (LWMC) | 23 |
| 4.6 FAISALABAD WASTE MANAGEMENT COMPANY (FWMC) | 23 |
| 4.7 CAPITAL DEVELOPMENT AUTHORITY (CDA), ISLAMABAD | 23 |
| 4.8 GILGIT-BALTISTAN WASTE MANAGEMENT COMPANY (GBWMC) | 24 |
| 4.9 TEHSIL MUNICIPAL ADMINISTRATION (TMA) RAHIM YAR KHAN | 24 |
| 4.10 MULTAN WASTE MANAGEMENT COMPANY (MWMC) | 24 |
| 5. RESULTS AND DISCUSSION | 26 |
| 5.1 PET WASTE GENERATION IN EACH CITY | 26 |
| 5.2 CITY-WISE REPRESENTATION OF RESULTS | 27 |
| 5.2.1 KARACHI | 27 |
| 5.2.1.1 WASTE MANAGEMENT COMPANY | 27 |
| 5.2.1.2 HOUSEHOLDS | 29 |
| 5.2.1.3 COMMERCIAL SECTOR | 32 |
| 5.2.1.4 SCAVENGERS | 35 |
| 5.2.1.5 JUNK DEALERS | 37 |
| 5.2.1.6 RECYCLERS | 40 |
| 5.2.2 FAISALABAD | 41 |
| 5.2.2.1 WASTE MANAGEMENT COMPANY | 41 |
| 5.2.2.2 HOUSEHOLDS | 41 |
| 5.2.2.3 COMMERCIAL SECTOR | 44 |
| 5.2.2.4 SCAVENGERS | 46 |
| 5.2.2.5 JUNK DEALERS | 48 |
| 5.2.2.6 RECYCLERS | 50 |
| 5.2.3 LAHORE | 52 |
| 5.2.3.1 WASTE MANAGEMENT COMPANIES | 52 |
| 5.2.3.2 HOUSEHOLDS | 55 |
| 5.2.3.3 COMMERCIAL SECTOR | 57 |
| 5.2.3.4 SCAVENGERS | 60 |
| 5.2.3.5 JUNK DEALERS | 63 |
| 5.2.3.6 RECYCLERS | 66 |
| 5.2.4 MURREE | 68 |
| 5.2.4.1 WASTE MANAGEMENT COMPANY | 68 |
| 5.2.4.2 HOUSEHOLDS | 69 |
| 5.2.4.3 COMMERCIAL SECTOR | 72 |
| 5.2.4.4 SCAVENGERS | 74 |
| 5.2.4.5 JUNK DEALERS | 76 |

| | |
|--|-----|
| 5.2.4.6 RECYCLER | 78 |
| 5.2.5 ISLAMABAD | 79 |
| 5.2.5.1 WASTE MANAGEMENT COMPANIES | 79 |
| 5.2.5.2 HOUSEHOLDS | 79 |
| 5.2.5.3 COMMERCIAL SECTOR | 83 |
| 5.2.5.4 SCAVENGERS | 85 |
| 5.2.5.5 JUNK DEALERS | 88 |
| 5.2.6 PESHAWAR | 90 |
| 5.2.6.1 WASTE MANAGEMENT COMPANIES | 90 |
| 5.2.6.2 HOUSEHOLDS | 90 |
| 5.2.6.3 COMMERCIAL SECTOR | 93 |
| 5.2.6.4 SCAVENGERS | 95 |
| 5.2.6.5 JUNK DEALERS | 98 |
| 5.2.6.6 RECYCLERS | 98 |
| 5.2.7 RAHIM YAR KHAN | 101 |
| 5.2.7.1 WASTE MANAGEMENT COMPANIES | 101 |
| 5.2.7.2 HOUSEHOLDS | 102 |
| 5.2.7.3 COMMERCIAL SECTOR | 105 |
| 5.2.7.4 SCAVENGERS | 107 |
| 5.2.7.5 JUNK DEALERS | 108 |
| 5.2.7.6 RECYCLERS | 110 |
| 5.2.8 MULTAN | 111 |
| 5.2.8.1 WASTE MANAGEMENT COMPANIES | 111 |
| 5.2.8.2 HOUSEHOLDS | 112 |
| 5.2.8.3 COMMERCIAL SECTOR | 115 |
| 5.2.8.4 SCAVENGERS | 118 |
| 5.2.8.5 JUNK DEALERS | 119 |
| 5.2.8.6 RECYCLERS | 121 |
| 5.2.9 GUJRANWALA | 122 |
| 5.2.9.1 WASTE MANAGEMENT COMPANIES | 122 |
| 5.2.9.2 HOUSEHOLDS | 122 |
| 5.2.9.3 COMMERCIAL SECTOR | 126 |
| 5.2.9.4 SCAVENGERS | 129 |
| 5.2.9.5 JUNK DEALERS | 132 |
| 5.2.9.6 RECYCLERS | 133 |
| 5.2.10 GILGIT-BALTISTAN | 134 |
| 5.2.10.1 WASTE MANAGEMENT COMPANIES | 134 |
| 5.2.10.2 HOUSEHOLDS | 135 |
| 5.2.10.3 COMMERCIAL SECTOR | 137 |
| 5.2.10.4 SCAVENGERS | 139 |
| 5.2.10.5 JUNK DEALERS | 142 |
| 5.2.10.6 RECYCLERS | 144 |
| 5.3 ANALYSIS OF WASTE MANAGEMENT IN SELECTED CITIES | 145 |
| 5.4 RESPONSES OF HOUSEHOLDS IN SELECTED CITIES | 146 |
| 5.5 RESPONSE OF THE COMMERCIAL SECTOR IN SELECTED CITIES | 148 |
| 5.6 RESPONSES OF SCAVENGERS IN SELECTED CITIES | 148 |
| 5.7 RESPONSES OF JUNK DEALERS IN SELECTED CITIES | 151 |
| 5.8 RESPONSES OF RECYCLERS IN SELECTED SITIES | 152 |

| | |
|--|------------|
| 6. CONCLUSION AND DISCUSSION | 155 |
| 7. STUDY CONSTRAINTS | 163 |
| 8. RECOMMENDATIONS | 165 |
| ANNEXURE - I | 166 |
| COMMERCIAL COMMUNITY QUESTIONNAIRE | 166 |
| COMMERCIAL COMMUNITY QUESTIONNAIRE | 167 |
| FORMAL SECTOR/WASTE MANAGEMENT COMPANY QUESTIONNAIRE | 168 |
| JUNK DEALERS QUESTIONNAIRE | 169 |
| RECYCLERS QUESTIONNAIRE | 170 |
| SCAVENGERS/INFORMAL SECTOR QUESTIONNAIRE | 172 |
| ANNEXURE - II | 174 |
| LIST OF SURVEY FACILITATORS | 174 |
| LIST OF HOTELS COVERED | 176 |
| LIST OF RESTAURANTS COVERED | 177 |
| REFERENCES | 181 |

LIST OF FIGURES

| | |
|--|----|
| FIGURE 1: OFFICIAL LOGO OF THE COCA-COLA COMPANY | 2 |
| FIGURE 2: OFFICIAL LOGO OF WWF | 2 |
| FIGURE 3: THE CURRENT SUPPLY CHAIN OF PET IN PAKISTAN | 7 |
| FIGURE 4 AND 5: COLLECTION BINS PLACED BY LWMC IN UC-95 | 8 |
| FIGURE 6: KEY PLAYERS IN THE WASTE RECYCLING INDUSTRY | 8 |
| FIGURE 7: THE METHODOLOGY FOLLOWED TO ACHIEVE OBJECTIVES | 16 |
| FIGURE 8: TEN CITIES OF SCOPING STUDY REPRESENTED ON THE MAP OF PAKISTAN | 17 |
| FIGURE 9: GARMIN GMAP 62S | 20 |
| FIGURE 10: PET GENERATED PER MONTH IN EACH CITY | 27 |
| FIGURE 11: WMCS IN KARACHI | 28 |
| FIGURE 12: ISSUES HINDERING WMCS FROM SEGREGATING WASTE IN KARACHI | 28 |
| FIGURE 13: APPROXIMATE AMOUNT OF PET LEFT IN WASTE COLLECTED IN KARACHI | 29 |
| FIGURE 14: LOCALITIES OF HOUSEHOLDS IN KARACHI | 30 |
| FIGURE 15: MAJOR CONSTITUENTS OF HOUSEHOLD PLASTIC WASTE IN KARACHI | 30 |
| FIGURE 16: MAJOR WASTE COLLECTORS IN KARACHI'S HOUSEHOLDS | 31 |
| FIGURE 17: WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 31 |
| FIGURE 18: PERCEPTION OF CITIZENS ON PLASTIC POLLUTION ON LAND AND WATER | 32 |
| FIGURE 19: COMMERCIAL SECTOR, KARACHI | 33 |
| FIGURE 20: RESPONSE OF KARACHI'S COMMERCIAL SECTOR ON WHETHER THEY SELL PET TO JUNK DEALERS | 34 |
| FIGURE 21: MONTHLY AVERAGE PET WASTE GENERATION BY EACH COMMERCIAL SECTOR OF KARACHI | 34 |
| FIGURE 22: SCAVENGER LOCALITIES IN KARACHI | 35 |
| FIGURE 23: AVERAGE RANGE OF PET COLLECTED BY SCAVENGERS PER DAY IN KARACHI | 36 |
| FIGURE 24: HOTSPOTS IN KARACHI FOR PET COLLECTION | 36 |
| FIGURE 25: WILLINGNESS OF KARACHI'S SCAVENGERS TO SUPPLY PET TO A RECOVERY FACILITY | 37 |
| FIGURE 26: LOCALITIES OF JUNK DEALERS IN KARACHI | 38 |
| FIGURE 27: PERCEPTION OF KARACHI'S JUNK DEALERS ON BUYING PET SEPARATELY OR WITH OTHER WASTE MATERIALS | 39 |
| FIGURE 28: VISIT TO A JUNK YARD FOR PET WASTE IN KARACHI | 39 |
| FIGURE 29: LOCALITIES OF RECYCLERS IN KARACHI | 40 |
| FIGURE 30: PLASTIC VIALS BEING MADE OUT OF RECYCLED PET | 40 |
| FIGURE 31: HOUSEHOLD LOCATIONS IN FAISALABAD | 42 |
| FIGURE 32: MAIN CONSTITUENTS OF HOUSEHOLD PLASTIC WASTE IN FAISALABAD | 42 |
| FIGURE 33: MAIN WASTE COLLECTORS OF HOUSEHOLDS IN FAISALABAD | 43 |
| FIGURE 34: WILLINGNESS OF FAISALABAD'S CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY | 44 |
| FIGURE 35: COMMERCIAL SECTOR LOCATIONS IN FAISALABAD | 45 |
| FIGURE 36: RESPONSE OF FAISALABAD'S COMMERCIAL SECTOR ON SELLING WASTE TO JUNK DEALERS | 45 |
| FIGURE 37: MONTHLY AVERAGE PET WASTE GENERATION BY EACH COMMERCIAL SECTOR OF FAISALABAD | 46 |
| FIGURE 38: SCAVENGER LOCALITIES IN FAISALABAD | 47 |
| FIGURE 39: COMMON AREAS WHERE SCAVENGERS COLLECT PET IN FAISALABAD | 47 |
| FIGURE 40: WILLINGNESS OF SCAVENGERS BASED IN FAISALABAD TO PROVIDE EMPTY PET BOTTLES TO A PLASTIC | 48 |

| | |
|---|----|
| RECOVERY FACILITY | 48 |
| FIGURE 41: JUNK DEALER LOCALITIES IN FAISALABAD | 49 |
| FIGURE 42: JUNK DEALERS' REASONS FOR BUYING PET WITH MIXED WASTE | 49 |
| FIGURE 43: RECYCLERS' LOCATIONS IN FAISALABAD | 50 |
| FIGURE 44: CONVEYER BELT AT MARHABA PLASTIC RECYCLER | 51 |
| FIGURE 45: CRUSHER AT MARHABA PLASTIC RECYCLER | 51 |
| FIGURE 46: PLASTIC HEAPS AT FAISALABAD'S RECYCLERS | 51 |
| FIGURE 47: LOCATIONS OF WASTE MANAGEMENT COMPANIES IN LAHORE | 53 |
| FIGURE 48: ISSUES HINDERING SEGREGATION OF WASTE IN LAHORE'S WASTE MANAGEMENT COMPANIES | 54 |
| FIGURE 49: PERCENTAGE OF PET IN WASTE COLLECTED ACCORDING TO LAHORE'S WMCS | 54 |
| FIGURE 50: HOUSEHOLD LOCALITIES INTERVIEWED IN LAHORE | 55 |
| FIGURE 51: MAJOR CONSTITUENTS OF HOUSEHOLD PLASTIC WASTE IN LAHORE | 56 |
| FIGURE 52: HOUSEHOLD WASTE COLLECTORS IN LAHORE | 56 |
| FIGURE 53: WILLINGNESS OF LAHORE'S CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY | 57 |
| FIGURE 54: COMMERCIAL SECTOR OF LAHORE | 58 |
| FIGURE 55: LAHORE'S COMMERCIAL SECTOR RESPONSES ON SELLING PET WASTE | 59 |
| FIGURE 56: AVERAGE AMOUNT OF PET WASTE GENERATED IN THE COMMERCIAL SECTOR OF LAHORE PER MONTH | 59 |
| FIGURE 57: SCAVENGER LOCALITIES IN LAHORE | 61 |
| FIGURE 58: HOTSPOT AREAS FOR PET COLLECTION BY SCAVENGERS IN LAHORE | 62 |
| FIGURE 59: CHALLENGES FACED BY SCAVENGERS IN LAHORE DURING PET COLLECTION | 62 |
| FIGURE 60: WILLINGNESS OF LAHORE'S SCAVENGERS TO PROVIDE PET TO A RECOVERY FACILITY | 63 |
| FIGURE 61: JUNK DEALER LOCALITIES IN LAHORE | 64 |
| FIGURE 62: REASONS FOR JUNK DEALERS BUYING PET WITH OTHER SELLABLE WASTE | 65 |
| FIGURE 63: WILLINGNESS OF JUNK DEALERS TO SUPPLY PET TO A RECOVERY FACILITY | 65 |
| FIGURE 64: LOCALITIES OF RECYCLERS IN LAHORE | 67 |
| FIGURE 65: RECYCLER IN CHINA SCHEME, LAHORE | 68 |
| FIGURE 66: CRUSHERS IN LAHORE | 68 |
| FIGURE 67: SORTING AND CLEANING OF CRUSHED PET | 68 |
| FIGURE 68: LOCALITIES OF HOUSEHOLDS INTERVIEWED IN MURREE | 69 |
| FIGURE 69: MAJOR CONSTITUENTS OF PLASTIC WASTE IN MURREE'S HOUSEHOLDS | 70 |
| FIGURE 70: MAJOR WASTE COLLECTORS IN HOUSEHOLDS IN MURREE | 70 |
| FIGURE 71: RESPONSE OF MURREE'S CITIZENS ON SELLING PET TO JUNK DEALERS | 71 |
| FIGURE 72: WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 71 |
| FIGURE 73: LOCATIONS OF INTERVIEWS CONDUCTED WITH HOTELS, RESTAURANTS AND INSTITUTIONS | 72 |
| FIGURE 74: MURREE'S COMMERCIAL SECTOR ON SEGREGATING THEIR WASTE | 73 |
| FIGURE 75: AMOUNT OF PET CONSUMED IN EACH COMMERCIAL SECTOR OF MURREE, IN KG PER MONTH | 73 |
| FIGURE 76: LOCALITIES OF SCAVENGERS, MURREE | 74 |
| FIGURE 77: PILE OF PET WASTE COLLECTED BY A SCAVENGER FOR SELLING | 74 |
| FIGURE 78: AVERAGE AMOUNT OF PET COLLECTED BY SCAVENGERS IN MURREE | 75 |
| FIGURE 79: LOCALITIES OF JUNK DEALERS, MURREE | 76 |
| FIGURE 80: JUNK DEALERS' REASONS FOR NOT BUYING PET SEPARATELY | 77 |
| FIGURE 81: SEGREGATED PET BOTTLES AT A JUNK DEALER IN MURREE | 77 |
| FIGURE 82: LOCATION OF A RECYCLER IN MURREE | 78 |
| FIGURE 83: CRUSHED PET BOTTLES PACKED IN SACKS | 78 |
| FIGURE 84: LOCALITIES OF HOUSEHOLDS, ISLAMABAD | 80 |
| FIGURE 85: MAJOR WASTE COLLECTORS IN ISLAMABAD'S HOUSEHOLDS | 81 |
| FIGURE 86: MAJOR CONSTITUENTS OF PLASTIC WASTE IN ISLAMABAD | 81 |
| FIGURE 87: WILLINGNESS OF CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY | 82 |

| | |
|--|-----|
| FIGURE 88: RESPONDENTS' OPINION ON PLASTIC CAUSING POLLUTION IN LAND AND WATER | 82 |
| FIGURE 89: COMMERCIAL COMMUNITY LOCATIONS IN ISLAMABAD | 83 |
| FIGURE 90: RESPONSE OF ISLAMABAD'S COMMERCIAL SECTOR ON SEGREGATING THEIR WASTE | 84 |
| FIGURE 91: AVERAGE AMOUNT OF PET CONSUMED IN EACH COMMERCIAL SECTOR OF ISLAMABAD | 84 |
| FIGURE 92: SCAVENGER LOCATIONS, ISLAMABAD | 86 |
| FIGURE 93: HOTSPOTS IN ISLAMABAD FOR PET COLLECTION | 87 |
| FIGURE 94: WILLINGNESS OF SCAVENGERS TO SUPPLY PET | 87 |
| FIGURE 95: LOCALITIES OF JUNK DEALERS, ISLAMABAD | 88 |
| FIGURE 96: ISLAMABAD'S JUNK DEALER'S RESPONSE TO BUYING PET SEPARATELY OR WITH OTHER WASTE MATERIALS | 89 |
| FIGURE 97: REASONS FOR PURCHASING PET WITH OTHER MATERIALS | 89 |
| FIGURE 98: HEAP OF PET BOTTLES AT A JUNK DEALER'S WAREHOUSE | 90 |
| FIGURE 99: HOUSEHOLD LOCATIONS OF RESPONDENTS IN PESHAWAR | 91 |
| FIGURE 100: MAJOR CONSTITUENTS OF HOUSEHOLD PLASTIC WASTE | 91 |
| FIGURE 101: MAJOR WASTE COLLECTORS IN PESHAWAR'S HOUSEHOLDS | 92 |
| FIGURE 102: PESHAWAR'S CITIZENS' WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 92 |
| FIGURE 103: COMMERCIAL COMMUNITY IN PESHAWAR | 93 |
| FIGURE 104: RESPONSE OF PESHAWAR'S COMMERCIAL SECTOR ON SEGREGATING THEIR WASTE | 94 |
| FIGURE 105: AMOUNT OF PET WASTE GENERATED IN KG PER MONTH | 94 |
| FIGURE 106: SCAVENGER LOCATIONS IN PESHAWAR | 96 |
| FIGURE 107: HOTSPOT AREAS FOR PET COLLECTION | 97 |
| FIGURE 108: SCAVENGERS' WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 97 |
| FIGURE 109: JUNK DEALER LOCALITIES IN PESHAWAR | 98 |
| FIGURE 110: A RECYCLER'S FACILITY IN PESHAWAR | 99 |
| FIGURE 111: PET BOTTLES CONVERTED INTO GRANULES AT A RECYCLING UNIT IN PESHAWAR | 99 |
| FIGURE 112: RECYCLERS IN PESHAWAR | 99 |
| FIGURE 113: PET CRUSHED AND MADE INTO HANGERS BY A RECYCLER | 100 |
| FIGURE 114: HEAPS OF PET AT A RECYCLER'S FACILITY IN PESHAWAR | 100 |
| FIGURE 115: HOUSEHOLD LOCATIONS IN RAHIM YAR KHAN | 102 |
| FIGURE 116: MAJOR CONSTITUENTS OF PLASTIC WASTE IN RAHIM YAR KHAN | 103 |
| FIGURE 117: MAJOR WASTE COLLECTORS IN RAHIM YAR KHAN'S HOUSEHOLDS | 103 |
| FIGURE 118: WILLINGNESS OF RAHIM YAR KHAN'S CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY | 104 |
| FIGURE 119: CITIZEN'S PERCEPTION OF PLASTICS CAUSING POLLUTION | 104 |
| FIGURE 120: COMMERCIAL COMMUNITY IN RAHIM YAR KHAN | 105 |
| FIGURE 121: RESPONSE OF RAHIM YAR KHAN'S COMMERCIAL SECTOR ON SEGREGATING WASTE | 106 |
| FIGURE 122: AMOUNT OF PET CONSUMED IN EACH COMMERCIAL SECTOR OF RAHIM YAR KHAN IN KG PER MONTH | 106 |
| FIGURE 123: SCAVENGER LOCALITIES IN RAHIM YAR KHAN | 107 |
| FIGURE 124: SCAVENGERS' WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 108 |
| FIGURE 125: LOCATIONS OF JUNK DEALERS IN RAHIM YAR KHAN | 108 |
| FIGURE 126: RAHIM YAR KHAN'S JUNK DEALERS' RESPONSE ON BUYING PET SEPARATELY OR WITH OTHER MATERIAL | 109 |
| FIGURE 127: RAHIM YAR KHAN'S JUNK DEALERS' RESPONSE FOR NOT BUYING PET SEPARATELY | 109 |
| FIGURE 128: LOCALITIES OF RECYCLERS IN RAHIM YAR KHAN | 110 |
| FIGURE 129: FLAKES OF CRUSHED PET BOTTLES, RAHIM YAR KHAN | 111 |
| FIGURE 130: FLAKES OF CRUSHED PET BOTTLES BEING WASHED, RAHIM YAR KHAN | 111 |
| FIGURE 131: LOCALITIES OF HOUSEHOLDS, MULTAN | 112 |
| FIGURE 132: MAJOR CONSTITUENTS OF PLASTIC WASTE IN MULTAN'S HOUSEHOLDS | 113 |
| FIGURE 134: WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 114 |
| FIGURE 135: PERCEPTION OF MULTAN'S INDIVIDUALS ON PLASTIC POLLUTION | 114 |
| FIGURE 136: COMMERCIAL COMMUNITY IN MULTAN | 116 |

| | |
|---|-----|
| FIGURE 137: RESPONSE OF MULTAN'S COMMERCIAL SECTOR ON SEGREGATING THEIR WASTE | 117 |
| FIGURE 138: AVERAGE PET WASTE GENERATED IN EACH COMMERCIAL SECTOR OF MULTAN | 117 |
| FIGURE 139: LOCALITIES OF SCAVENGERS IN MULTAN | 118 |
| FIGURE 140: SCAVENGER HOTSPOTS IN MULTAN FOR PET COLLECTION | 119 |
| FIGURE 141: LOCALITIES OF JUNK DEALERS IN MULTAN | 119 |
| FIGURE 142: MULTAN'S JUNK DEALER'S RESPONSE TO BUYING PET WASTE SEPARATELY | 120 |
| FIGURE 143: MULTAN'S JUNK DEALERS' OPINION REGARDING THE PROCUREMENT OF PET WITH OTHER WASTE MATERIAL | 120 |
| FIGURE 144: LOCALITIES OF RECYCLERS IN MULTAN | 121 |
| FIGURE 145: HEAPS OF PET BOTTLES AT A RECYCLER'S FACILITY IN MULTAN | 121 |
| FIGURE 146: DUMPING SITE OF GUJRANWALA | 122 |
| FIGURE 147: TRUCKS OF GWMC AT DUMPSITE, GUJRANWALA | 122 |
| FIGURE 148: LOCALITIES OF HOUSEHOLDS, GUJRANWALA | 123 |
| FIGURE 149: MAJOR CONSTITUENTS OF PLASTIC WASTE IN GUJRANWALA | 124 |
| FIGURE 150: MAJOR WASTE COLLECTORS IN GUJRANWALA'S HOUSEHOLDS | 124 |
| FIGURE 151: WILLINGNESS OF INDIVIDUALS OF GUJRANWALA TO PROVIDE PET TO A RECOVERY FACILITY | 125 |
| FIGURE 152: PERCEPTION OF GUJRANWALA'S INDIVIDUALS ON PLASTIC POLLUTION | 125 |
| FIGURE 153: LOCALITIES OF THE COMMERCIAL SECTOR, GUJRANWALA | 127 |
| FIGURE 154: COMMERCIAL SECTOR'S RESPONSES ON SEGREGATING THEIR WASTE | 128 |
| FIGURE 155: PET BOTTLE CONSUMPTION IN THE COMMERCIAL SECTOR OF GUJRANWALA | 129 |
| FIGURE 156: SCAVENGER LOCATIONS IN GUJRANWALA | 130 |
| FIGURE 157: SCAVENGER HOTSPOTS FOR PET COLLECTION IN GUJRANWALA | 130 |
| FIGURE 158: WILLINGNESS OF SCAVENGERS TO SUPPLY PET TO RECOVERY FACILITIES, GUJRANWALA | 131 |
| FIGURE 159: SCAVENGERS UNLOADING WASTE FROM THEIR DONKEY CART IN GUJRANWALA | 131 |
| FIGURE 160: LOCALITY OF JUNK DEALER, GUJRANWALA | 132 |
| FIGURE 161: HEAPS OF PET WASTE AT JUNK DEALER'S WASTE YARD, GUJRANWALA | 133 |
| FIGURE 162: SACKS OF PET BOTTLES SUPPLIED BY SCAVENGERS, GUJRANWALA | 133 |
| FIGURE 163: CRUSHER UNIT AT A RECYCLER'S FACILITY IN GUJRANWALA | 133 |
| FIGURE 164: CRUSHER UNIT OF RECYCLER, GUJRANWALA | 133 |
| FIGURE 165: LOCALITIES OF RECYCLERS, GUJRANWALA | 134 |
| FIGURE 166: LOCALITIES OF HOUSEHOLDS, GILGIT | 135 |
| FIGURE 167: MAJOR CONSTITUENTS OF HOUSEHOLD WASTE IN GILGIT | 136 |
| FIGURE 168: MAJOR WASTE COLLECTORS IN HOUSEHOLDS OF GILGIT | 136 |
| FIGURE 169: WILLINGNESS OF GILGIT'S CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY | 137 |
| FIGURE 170: LOCALITIES OF THE COMMERCIAL COMMUNITY, GILGIT | 138 |
| FIGURE 171: RESPONSE OF GILGIT'S COMMERCIAL SECTOR ON WASTE SEGREGATION | 138 |
| FIGURE 172: AVERAGE PET WASTE GENERATED IN COMMERCIAL SECTOR IN KG PER MONTH | 139 |
| FIGURE 173: LOCALITIES OF SCAVENGERS, GILGIT | 140 |
| FIGURE 174: SCAVENGERS' HOTSPOT FOR PET COLLECTION IN GILGIT | 141 |
| FIGURE 175: WILLINGNESS OF GILGIT'S SCAVENGERS TO SUPPLY PET TO A RECOVERY FACILITY | 142 |
| FIGURE 176: LOCALITIES OF JUNK DEALERS, GILGIT | 143 |
| FIGURE 177: LOCALITY OF RECYCLERS, GILGIT | 144 |
| FIGURE 178: HEAPS OF PET BOTTLES AT A RECYCLER'S FACILITY IN GILGIT | 144 |
| FIGURE 179: PET BOTTLES PACKED IN SACKS READY FOR TRANSPORTATION | 145 |
| FIGURE 180: CRUSHING UNIT IN GILGIT | 145 |
| FIGURE 181: WASTE GENERATION VS WASTE COLLECTION PER MONTH BY WMCS IN ALL CITIES | 145 |
| FIGURE 182: AVERAGE NUMBER OF PET BOTTLES USED PER CAPITA PER MONTH IN HOUSEHOLDS | 146 |
| FIGURE 183: WILLINGNESS OF HOUSEHOLDS TO PROVIDE THEIR PET BOTTLES TO A PLASTIC RECOVERY FACILITY | 147 |
| FIGURE 184: AWARENESS LEVEL OF HOUSEHOLDS ON PLASTICS CAUSING POLLUTION ON LAND AND WATER | 147 |

| | |
|--|-----|
| FIGURE 185: BALES OF COMPRESSED PET BOTTLES READY FOR TRANSPORT | 147 |
| FIGURE 186: COMMERCIAL SECTOR'S RESPONSE TO SEGREGATING THEIR WASTE IN ALL SELECTED CITIES | 148 |
| FIGURE 187: HOTSPOT AREAS FOR COLLECTION OF PET WASTE BY SCAVENGERS IN EACH CITY | 149 |
| FIGURE 188: AVERAGE AMOUNT OF PET COLLECTED BY ONE SCAVENGER PER DAY | 149 |
| FIGURE 189: CHALLENGES OF SCAVENGERS IN PET COLLECTION IN 10 CITIES | 150 |
| FIGURE 190: WILLINGNESS OF SCAVENGERS TO SUPPLY PET TO A RECOVERY FACILITY | 150 |
| FIGURE 191: JUNK DEALERS' RESPONSE TO BUYING PET SEPARATELY OR WITH OTHER WASTE MATERIALS | 151 |
| FIGURE 192: JUNK DEALERS' WILLINGNESS TO SUPPLY PET TO A RECOVERY FACILITY | 151 |
| FIGURE 193: HEAPS OF PET BOTTLES READY TO BE EXPORTED | 152 |
| FIGURE 194: COLLECTED PET BOTTLES AT A JUNK DEALER | 152 |
| FIGURE 195: AVERAGE AMOUNT OF PET WASTE RECYCLED BY ONE RECYCLER IN EACH CITY IN TONNES PER MONTH | |
| FIGURE 196: RECYCLERS' WILLINGNESS TO CREATE NEW PRODUCTS OUT OF PET | 153 |
| FIGURE 197: PET BOTTLES READY TO BE RECYCLED | 153 |
| FIGURE 198: PET CRUSHING FACILITY | 153 |
| FIGURE 199: RESPONSE OF ALL STAKEHOLDERS ON BEING ASKED WHETHER PLASTICS CAUSE POLLUTION | 155 |
| FIGURE 200: STAKEHOLDER PERCEPTION AS TO WHY PLASTICS ARE CAUSING POLLUTION | 156 |
| FIGURE 201: STAKEHOLDER'S WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY | 156 |
| FIGURE 202: PET GENERATED PER MONTH IN KG IN EACH CITY | 157 |
| FIGURE 203: PERCENTAGE OF PET IN DUMPSITES AND WATER BODIES ACCORDING TO STAKEHOLDERS IN THE PET SUPPLY CHAIN | 158 |
| FIGURE 204: PERCENTAGE OF PET BEING RECYCLED ACCORDING TO STAKEHOLDERS OF PET SUPPLY CHAIN | 159 |
| FIGURE 205: CITY-WISE PERCENTAGE OF PET BEING RECYCLED ACCORDING TO STAKEHOLDERS IN SUPPLY CHAIN | 160 |
| FIGURE 206: CITY-WISE PET PERCENTAGE ENDING UP IN DUMPSITES AND WATER BODIES ACCORDING TO STAKEHOLDERS IN PET SUPPLY CHAIN | 161 |

LIST OF TABLES

| | |
|--|-----|
| TABLE 1: PROFILES OF EACH CITY | 10 |
| TABLE 2: SAMPLE SIZE FOR EACH STAKEHOLDER IN ALL CITIES | 18 |
| TABLE 3: PET WASTE GENERATED IN EACH CITY | 26 |
| TABLE 4: WMCS WASTE COLLECTION EFFICIENCY IN SELECTED CITIES | 146 |

LIST OF ACRONYMS

| | |
|--------------|---|
| PET | Polyethylene Terephthalate |
| GPS | Global Positioning System |
| GIS | Geographic Information System |
| SPSS | Statistical Package for the Social Sciences |
| SSWM | Sindh Solid Waste Management |
| WSSP | Water and Sanitation Services Peshawar |
| LWMC | Lahore Waste Management Company |
| FWMC | Faisalabad Waste Management Company |
| CDA | Capital Development Authority |
| GBWMC | Gilgit-Baltistan Waste Management Company |
| TMA | Tehsil Municipal Administration |
| MWMC | Multan Waste Management Company |
| SWM | Solid Waste Management |
| KG | Kilogram |
| PKR | Pakistani Rupees |
| USD | US Dollar |
| SEPA | Sindh Environment Protection Act |
| KIU | Karakoram International University |
| FMCG | Fast Moving Consumer Goods |
| CSR | Corporate Social Responsibility |
| PCB | Polychlorinated Biphenyl |
| UC | Union Council |

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EXECUTIVE SUMMARY

In the contemporary world, plastic waste management has proven to be one of the most grievous issues; the intensity of which can be ascertained by the fact that globally eight million tonnes of plastic waste is disposed off in oceans on an annual basis, translating into a plethora of repercussions for the environment. Pakistan has the second-largest domestic market for plastics in Southeast Asia after India; with a growth rate of 15 percent per annum. However, at the same time, it has limited resources and an even more fragile waste management system in place to cater to the growing amount of plastic and municipal waste being generated. It comes as no surprise that among all the rivers of the world, the Indus River of Pakistan is the second biggest receiver of plastic waste. To address the problem, there was a need to identify the process of the PET bottle supply chain, quantify the number of bottles ending up in landfills and water bodies, and identify the challenges of the informal recycling sector. WWF-Pakistan and The Coca-Cola Foundation joined hands to improve the recovery and recycling of PET bottles by establishing a baseline by conducting a thorough research study in 10 major cities of Pakistan including Lahore, Karachi, Islamabad, Peshawar, Gilgit, Murree, Rahim Yar Khan, Multan, Gujranwala and Faisalabad.

Four major stakeholders were addressed in the study: the informal sector which includes scavengers, junk dealers and recyclers; formal waste collectors such as the public and private waste management companies; the commercial sector comprising of hotels, educational institutes, restaurants; and lastly household consumers of PET bottles. Interviews were conducted with all stakeholders along with survey questionnaires through which data was collected to analyze PET consumption, collection, disposal and recycling patterns in the selected cities. PET waste generation was calculated for all 10 cities; it was found that Karachi had the highest PET waste generation of 5,551,992 kg per month. The lowest PET waste generation was in Murree, with 86,315 kg per month. Overall, it was found that 22,332,636 kgs of PET waste was being generated by all 10 cities, which was equivalent to 2.7 percent of the total waste generation.

The formal and informal waste management sector are key players in the collection, recovery and recycling of PET waste. Through these experienced sources, it was found that PET recycling is carried out informally at a large scale. A total of 62 percent of stakeholders from the PET supply chain reported that 100 percent of PET is recycled. About 22 percent of respondents stated that 50 percent of PET is recycled. While, 12 percent of respondents were not sure of the quantities of PET being recycled, and only a meagre amount of stakeholders stated that less than 5 percent of PET was recycled. In conclusion, a total of 87 percent of stakeholders from the PET supply chain, who responded based on their experience of PET waste collection, distribution, buying and selling, stated that PET is being recycled.

Overall, about 94 percent of all stakeholders confirmed that all forms of plastics are a major cause of pollution in land and water bodies. It was found that the majority of stakeholders perceived that plastics were a source of pollution because they are carcinogenic, they cause marine pollution, contribute to microplastic litter and cause air pollution due to burning. There was a small percentage (three percent) of people who knew that plastics were causing pollution but were not sure how.

In order to identify the amount of PET that ends up in dumpsites and water bodies, key personnel in the PET supply chain were interviewed. It was found that around 58 percent of stakeholders in the supply chain reported that zero percent of PET waste ends up in water bodies and dumpsites; only about five percent of these stakeholders stated that 100 percent of PET was leaking either into water bodies or was being dumped in open spaces. Around 14 percent of stakeholders in the PET supply chain stated that 50 percent of post-consumer PET bottles were leaking into water bodies or were being openly dumped; while around 15 percent of stakeholders in the supply chain were unsure about the status of the PET waste. Overall, about 28 percent of stakeholders in the supply chain stated that some PET did leak into water bodies and dumpsites. This was also verified during field visits to dumpsites and open drains.

Since this study aims to promote awareness among all stakeholders about waste segregation at the

source, pollution caused by plastics and encourages PET recycling, the perception of the general public and the formal and informal waste sector was also gauged to establish a plastic recovery facility. According to the combined result of all stakeholders, around 82 percent were willing to provide PET to a recovery facility; about 18 percent, however, were not willing to do so. The respondents who were unwilling were mostly junk dealers and scavengers as they were satisfied with the current supply chain model. Some households showed indifference towards the issue of PET pollution.

1. STUDY BACKGROUND

The Coca-Cola Company is a multinational manufacturer, retailer and marketer of non-alcoholic beverages and syrups. Beverage packaging primarily includes aluminium cans, glass and plastic bottles prepared from Polyethylene Terephthalate (PET).

Coca-Cola's **World Without Waste**¹ programme was launched globally in 2018. The programme aims to collect and recycle 100 percent of its packaging worldwide and manufacture its bottles using 50 percent recycled plastic by 2030.

WWF-Pakistan and The Coca-Cola Foundation have collaborated to establish a baseline on PET pollution in Pakistan.

WWF-Pakistan, a non-governmental organization, is part of the WWF network, which aims to address growing environmental and conservation issues. Over the past years, WWF-Pakistan has strived to conserve nature and the natural resources of Pakistan by focusing on six practices including oceans, forests, wildlife, climate and energy, food and freshwater and measuring the progress against established indicators.

Keeping in line with its mission to reduce pollution, WWF-Pakistan actively takes part in local and global campaigns focusing on mitigating and eliminating plastic pollution. Some of these include the "No Plastics in Nature" campaign, "Beat Plastic Pollution" campaign and the "Plastic Diet" campaign. WWF-Pakistan also addresses marine plastic pollution under the Oceans practice and actively aims to involve students in finding innovative solutions for plastic recovery and recycling by holding competitions such as the Green Innovation Challenge (GIC).²



collect and recycle

100 %

of its
packaging worldwide



and manufacture its
bottles using

50 %

recycled plastic

by 2030

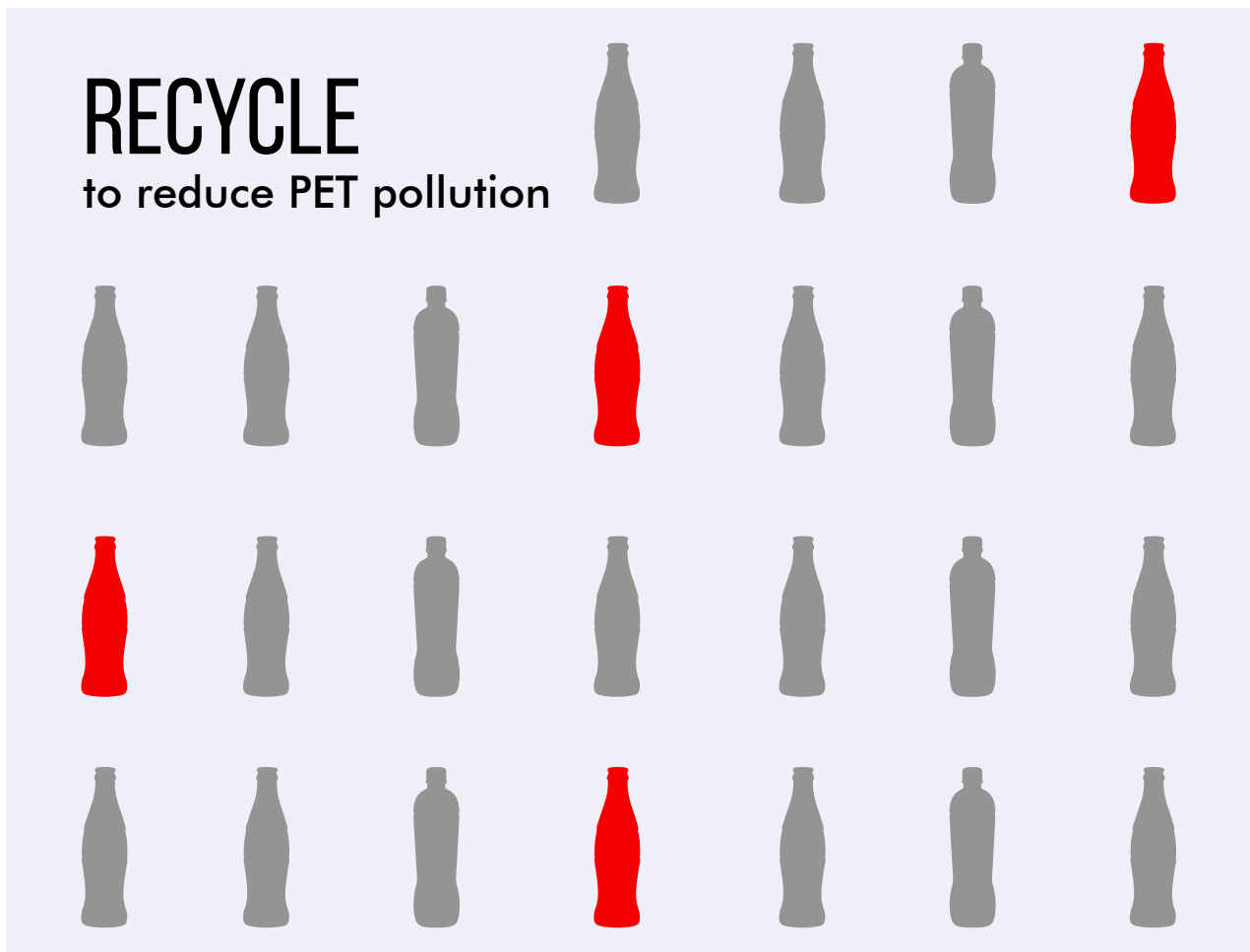
As part of their initiatives, The Coca-Cola Foundation, along with WWF-Pakistan, partnered to create awareness about plastic pollution and improve the recovery of PET. Due to limited research available on the amount of PET collected and recycled in the country, this scoping study was conducted to establish a baseline on PET pollution in Pakistan, understand the amount of PET waste currently being collected, recycled and dumped in landfills and water bodies, and recommend solutions to tackle plastic pollution caused by PET bottles.



Figure 1. Official logo of The Coca-Cola Company



Figure 2. Official logo of WWF





2. INTRODUCTION



2.1 WHAT IS PET?

Polyethylene Terephthalate (PET) is a plastic resin and a form of polyester made of two monomers. The substance is best known as the clear plastic used for water and soda bottles. Other than beverage bottles, PET is also commonly used to make medicine jars, rope, clothing and carpet fiber.³ In many countries, PET is coded with the resin identification code "1" inside the universal recycling symbol, located at the bottom of the container, signifying that the product is made of Polyethylene Terephthalate (PET).⁴ It is globally recognized as safe, lightweight, and flexible for food and non-food packaging, and is also 100 percent recyclable.⁵

PET, usually in the form of bottles, can be recycled a maximum of ten times⁶ to create new products such as polyester carpet fibre, fabric for t-shirts, athletic shoes, luggage, upholstery, and even automotive parts. The use of recycled PET in place of virgin resin typically results in reduced energy consumption, lower costs, and reduced environmental impact.⁷



2.2 GLOBAL SCENARIO

Around the world, one million plastic drinking bottles are purchased every minute, while up to five trillion single-use plastic bags are utilized.⁸ This has naturally led to a global plastic waste management crisis. Hence, countries all over the world have taken measures, at various levels, to reduce plastic pollution.

- India's Prime Minister has pledged to eliminate all single-use plastic in the country by 2022 with an immediate ban in New Delhi.⁹
- South American countries such as Antigua and Barbuda, Belize, and Costa Rica have all pledged to become single-use and plastic-free by 2021.¹⁰
- Microbead-free Waters Act was promulgated by the US government in 2015.¹¹ It prohibits the addition of plastic microbeads in the manufacturing of certain personal care products. The purpose of the law is to reduce water pollution caused by these products.
- New Zealand has given its retailers an ultimatum to either stop providing single-use plastics or face fines up to USD 66,000.¹²

2.3 SCENARIO IN PAKISTAN

In Pakistan, the use of PET bottles started in the mid-eighties when international beverage companies such as Coca-Cola and PepsiCo expanded their production line to South Asia. Within a couple of years, more PET bottle manufacturing industries began to surface. The bottling industry is now booming at an annual average rate of 15 percent,¹³ and Pakistan now stands as the second-largest domestic market for Southeast Asia after India.¹⁴ According to a study conducted by WWF-Pakistan, plastic accounts for 65 percent of total waste ending up on beaches. The waste includes PET bottles, caps, plastic bags, balloons, packages, shoes, discarded fishing nets and wrecked apparatuses.¹⁵

77,000

The Government of Pakistan estimates that **77,000 tonnes** of solid waste is generated per day.

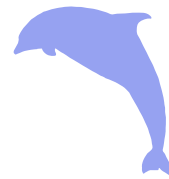
Like other developing countries, Pakistan lacks a comprehensive waste management system with no proper disposal or post-use treatment of plastics, hence contributing to serious environmental problems. Since most municipal waste is burned, dumped or buried in vacant areas, it threatens the health and welfare of the general population. The Government of Pakistan estimates that 77,000 tonnes of solid waste is generated per day, mostly from major metropolitan areas. Karachi, Pakistan's largest city, generates more than 13,000 tonnes of municipal waste on a daily basis. All major cities face enormous challenges while managing urban waste and its root cause can be attributed to bureaucratic hurdles, lack of urban planning, inadequate waste management equipment, and lack of public awareness.¹⁶ Poor infrastructure management results in plastic pollution in water bodies and landfill sites. According to the UN Environment Programme (UNEP), Pakistan's Indus River is the second most plastic-polluted river in the world, carrying over 164,332 tonnes of plastic waste.¹⁷

2.4 IMPACT OF PLASTIC POLLUTION ON THE MARINE ENVIRONMENT

Over the past years, the world's oceans have become a global dumping ground for plastics, which are now responsible for 60-80 percent of marine garbage.¹⁸ This practice has become so frequent that according to research, in the near future, every twelfth item collected from the ocean will be a plastic bag. Pakistan faces a similar situation; a mammoth amount of waste is dumped directly into the Arabian Sea without paying heed to the consequences.¹⁹

Plastic debris causes the death of more than a million seabirds every year, as well as more than 100,000 marine mammals.²⁰

It has been reported that globally, one out of three marine mammals are found entangled in plastic litter.²¹ Similarly, research indicates that around 90 percent of seabirds digest plastic. Moreover, plastic additives such as PCBs, DDT, pesticides, furans, dioxins, phenols and radioactive waste are known to disrupt the endocrine system. When consumed, plastic additives can suppress the marine system, and decrease reproduction rates.²²



100,000+

Plastic debris causes the death of more than **100,000** marine mammals.

1 IN 3

1 out of 3 marine mammals are found entangled in plastic litter.

2.5 LAND-BASED IMPACTS OF PLASTIC POLLUTION

Plastic contains chemicals or additives to give it certain properties. Some of the key chemicals include bisphenol A (BPA), which has negative impacts on reproductive systems; phthalates, which disrupt endocrines; and brominated flame retardants that have hormone-disrupting effects, hence impairing the development of the reproductive and nervous system in humans.²³ Furthermore, plastic chemicals have a tendency to absorb and combine with other substances. For example, a plastic bag will pick up or adsorb mercury or cadmium from material floating adjacent to it, thereby magnifying the toxicity level.²⁴ Sewage water then transports these toxic items to the land and marine environment.

Additionally, 80 to 90 percent of the plastic particles from garment fibers and other sources present in sewage persist in sludge as well. This is particularly alarming since sewage sludge is often applied to fields as fertilizer, due to which, several thousand tonnes of micro-plastics end up in our soils each year.²⁵

Further, when plastics are dumped in landfills, the hazardous chemicals present in them seep underground when it rains. The leaching chemicals and toxic elements infiltrate into the aquifers and water table, indirectly affecting groundwater quality. Eventually, it thwarts the efforts of water conservation around the world, compromising the sustainability of water bodies.²⁶

2.6 PLASTIC LEGISLATION IN PAKISTAN

In addition to poor waste management, legislation regarding plastic pollution is limited only to polyethylene bags and is poorly implemented.

2.6.1 PUNJAB

- Punjab Prohibition on Manufacture, Sale, Use and Import of Polythene Bags (black or any other polythene bag below 15 microns thickness) Ordinance, 2002
- Punjab Prohibition on Manufacture, Sale, Use and Import of Polythene Bags (black or any other polythene bag below 15 microns thickness) Rules, 2004.²⁷

2.6.2 SINDH

- Sindh Environment Protection Act (SEPA) 2014 and its section 14(3) reads, "...no person shall import, manufacture, stockpile, trade, supply, distribute or sell any scheduled plastic product which is non-degradable. The scheduled plastic products must be oxo-biodegradable and the pro-degradant used must be approved by the agency."²⁸

2.6.3 KHYBER PAKHTUNKHWA

- Uses and manufacturing of non-biodegradable plastic products have been prohibited under Khyber Pakhtunkhwa Environmental Protection Act of 2014 (Act No. XXXVIII of 2014).

2.6.4 BALOCHISTAN

- The Balochistan government promulgated an ordinance on 19 February 2001, titled: "The Balochistan Prohibition on Use and Sale of Polythene Bags Ordinance, 2001," prohibiting the sale and use of polythene bags, in the province.²⁹

2.6.5 ISLAMABAD CAPITAL TERRITORY

- A ban on plastic bags was imposed in Islamabad Capital Territory (ICT) on 14 August 2019. A US\$ 70 levy was imposed on residents to ensure compliance.

2.7 CURRENT SUPPLY CHAIN OF PET BOTTLES IN PAKISTAN

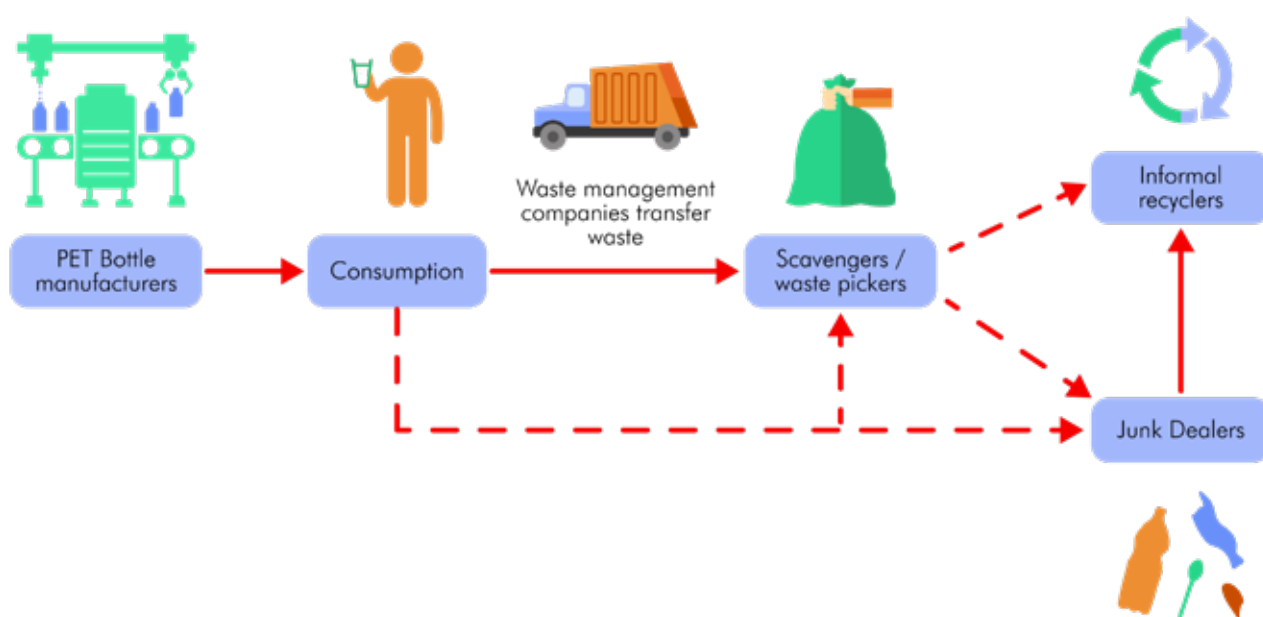


Figure 3. The current supply chain of PET in Pakistan

Figure 3 represents the current supply chain of PET bottles in Pakistan. The supply chain consists of six major stakeholders: manufacturers, consumers, waste management companies, scavengers, junk dealers and recyclers.

2.7.1 PET MANUFACTURING & DISTRIBUTION

Currently, 70 percent of PET resin is produced in Pakistan, while the rest is imported. Gatron and Novatex are the major PET manufacturers that produce over 345,000 Mt per annum of PET resin and divide it almost equally between

the local and export market. The companies then use this PET resin to produce standardized and consistent 2.5 billion preforms per year, which are later blown into PET bottles.³⁰ These PET bottles are then distributed to major distributors such as Coca-Cola, PepsiCo, Nestle, Shezan and Qarshi. These distributors and manufacturers have designated workers that collect PET waste left behind after production, along with mixed waste, which may be segregated later on by scavengers and junk dealers from dumping sites.

2.7.2 PUBLIC & PRIVATE WASTE MANAGEMENT COMPANIES

Waste management companies are normally responsible for the collection, transportation, disposal and monitoring of waste.³¹ It is estimated that in Pakistan, only 60-70 percent of solid waste is collected in cities, while the rest remains in open dumps or ends up in water bodies as depicted in Figures 4 and 5.³² Waste that is collected is not sorted or recycled by the waste management companies operating in Pakistan. Despite this, there is little to no PET present at dumpsites or landfills as informal waste pickers collect almost all PET waste following its disposal.



Figure 4 and 5
Collection bins placed by LWMC in UC-95

2.7.3 POST-CONSUMER USE / INFORMAL RECYCLING

Waste pickers/scavengers are an integral part of the informal recycling system. This process is normally undertaken without government financial support and is generally considered to be an invaluable service by the public.³³ Nevertheless, it is the only large-scale system in place for recycling in Pakistan.

Despite being informal, the sector comprises of fixed stages and key players that contribute to recycling as shown in Figure 6.

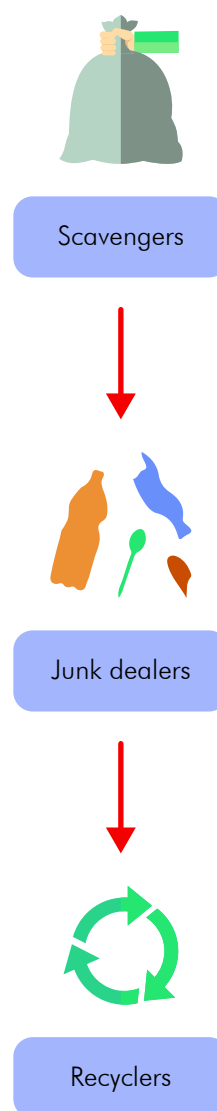


Figure 6
Key players in the waste recycling industry

2.7.4 SCAVENGERS / WASTE PICKERS

It has been estimated that in cities of developing countries, about two percent of the population earns by scavenging and waste picking activities. These waste pickers and scavengers scour through household, commercial and industrial waste to retrieve any collectable and valuable items to sell. Commonly, they tend to pick PET bottles, paper and metals due to their recycling potential and long lifespan. These waste pickers are mostly from marginalized communities which lack access to technology, finances and knowledge of health and safety standards. Due to their direct and daily contact with waste and the absence of personal protective equipment, they become vulnerable to a plethora of enteric and parasitic diseases.³⁴

Furthermore, municipalities and waste management companies tend to consider waste pickers as a problem as they often scatter waste constituents of garbage bags and bins to salvage anything of value. They do not put the garbage back, which increases the cost of waste collection, making cities look dirty. As a result, informal waste picking activities have been discouraged in most cities.³⁵

Regardless, waste picking activities continue to thrive in Pakistan and provide great monetary benefits to those involved. This results in scavengers and their contractors yielding high incomes from this business.

On average, waste pickers earn PKR 25 to 40 for selling one kilogram of PET bottles.

This rate fluctuates throughout the year based on the demand and supply of PET bottles from distributors.

Waste pickers aren't the only ones benefiting from selling useful waste. The waste management system allows many individuals to benefit from collecting and selling recyclables. These include maids and janitorial staff at hotels, restaurants etc who sort items and sell them to junk dealers prior to their disposal.

2.7.4.1 CHILD LABOUR



Upon observation, it was found that most waste picking activities are carried out by children under the age of nine. This is primarily due to the fact that labour laws are not strictly followed. Furthermore, due to widespread poverty and high personnel demand in the informal waste management sector, parents send their children to scour through waste all day. Even if parents are not willing to send their children for waste picking activities, contractors pressurize them to continue doing so. Scavengers are already disillusioned about their career prospects, believing waste picking to be their only source of income and survival. Hence, they feel obligated to do as the contractor says.³⁶ This way, the contractors get cheap labour and high collection efficiency. This use of child labour is not only hazardous but also does not provide any room for skill development.

2.7.5 JUNK /SCRAP DEALERS

The majority of junk dealers in Pakistan are unregistered and work informally. They purchase all recyclables from waste pickers and then sort and sort the waste before processing it further. After sorting and cleaning, recyclables are sold to traders, main dealers, recyclers and sometimes even large-scale enterprises. These middlemen tend to purchase materials at lower prices from waste pickers and then sell off the segregated waste at a profit margin of PKR 10 or 15 to industries.



2.7.6 RECYCLERS / PROCESSORS

150

On average, a recycler collects and recycles about **150 tonnes** of PET per month.

Due to the unavailability of a legal framework on sustainable collection and recycling of PET bottles, most recycling/processing units in Pakistan work informally by utilizing low-grade crushers, child labour and disregarding environmental, health and safety standards. All PET bottles are either acquired from junk dealers or scavengers.

The collected bottles are directly put into a crushing machine after removing the bottle cap. The flakes are then washed and waste materials separated from the PET. After this, PET flakes are either exported to China, converted to pellets, sold to the textile industry or melted and transformed into pellets to make new PET bottles or cutlery. Since most recycling plants are private and remain unmonitored, they may convert the PET into low-quality plastic and sell it as food grade plastic. This can damage the health of the people consuming food in these plastic boxes or using the utensils. In addition, brick kilns also use discarded plastic as a source of fuel, which results in stunted mental and physical growth of children.

2.8 CITY PROFILES

| Sr. No | City | Population ³⁷ | Urban Population | Rural Population | Number of Households | Growth Rate | Waste Generation (tons/day) |
|--------|----------------|--------------------------|------------------|------------------|----------------------|---------------------|-----------------------------|
| 1 | Lahore | 11,126,285 | 11,126,285 | — | 1,757,691 | 4.12% ³⁸ | 6800 |
| 2 | Islamabad | 2,001,579 | 1,009,832 | 991,747 | 335,408 | 3.44% | 1000 |
| 3 | Karachi | 16,009,988 | 14,916,456 | 1,093,532 | 2,770,626 | 2.53% | 12,280 |
| 4 | Peshawar | 4,269,079 | 1,970,042 | 2,299,037 | 489,843 | 3.99% ³⁹ | 1900 |
| 5 | Gilgit | 216,760 | — | — | — | — | 50 |
| 6 | Rahim Yar Khan | 4,814,006 | 1,032,636 | 3,781,370 | 701,520 | 2.27% | 1076 |
| 7 | Murree | 233,471 | 25,816 | 207,655 | — | — | 60 |
| 8 | Faisalabad | 7,874,790 | 3,761,208 | 4,113,582 | 1,225,413 | 1.97% | 2461 |
| 9 | Gujranwala | 5,014,196 | 2,948,936 | 2,065,260 | 747,214 | 2.06% | 3,125 |
| 10 | Multan | 4,745,109 | 2,058,290 | 2,686,819 | 760,858 | 2.23% | 1800 |

Table 1: Profiles of each city

The present study of PET waste analysis revolved around 10 major cities of Pakistan which represent the four regions, i.e. Sindh, Punjab, Khyber Pakhtunkhwa and Gilgit-Baltistan. The cities surveyed include Karachi, Lahore, Islamabad, Peshawar, Rahim Yar Khan, Multan, Murree, Faisalabad, Gujranwala and Gilgit. In order to understand PET consumption patterns, collection system, recycling and disposal methods, the demographics, economic growth, waste management mechanisms, disposal methods, daily waste generation and commercial activities of each city were analysed. A brief profile of each is presented in Table 1.

2.8.1 KARACHI

Karachi is the capital of Sindh and is the most populous city in Pakistan; it is the economic and industrial hub of the country. Karachi is a diverse city consisting of mixed spatial land use; it is also considered a tourist hot spot owing to its location along a natural harbour on the Arabian Sea. The population of the metropolitan has seen an increase from nine million in 1998 to 16 million in 2017, with an urban population of 14,196,456 and rural population of 1,093,532. It has grown by 60 percent in the last two decades at 2.5 percent per annum.

There are a 18 towns in Karachi, consisting of 2,770,626 households that cumulatively produce 12,280 tonnes of waste a day.⁴⁰

This waste mainly comprises of food waste, green waste, paper, glass, metals, plastic, dirt, nappies, Tetra Pak, wood etc.

Currently, six waste management companies are collecting this waste from residential, industrial and commercial areas, and discarding it in different dumping/landfill sites, which include Gond Pas, Jam Chakro, Dhabeji, Mehmoodabad, Safari Park, Lines Area, Orangi, Meva Shah, Korangi graveyard and Bilalabad.⁴¹

2.8.2 LAHORE

Lahore is the capital of Punjab and the second-most populous city of Pakistan. It is the historical and cultural hub of Punjab. With a population of 11,126,285, the city has expanded over the years and has a growth rate of 4.1 percent.

There are nine towns in Lahore with 1,797,651 households producing approximately 6,800 tonnes of waste per day.⁴²

This waste mainly includes glass, biodegradable items, combustibles, e-waste, hazardous waste, metals, plastic bags, plastic cardboard, plastic, Tetra Pak and textile materials. All this waste is being dumped in Lakhodair and Saggian.

2.8.3 ISLAMABAD

Islamabad, the capital city of Pakistan, is federally administered as the Islamabad Capital Territory (ICT). According to the 2017 census, the city has a population of 2,001,579, out of

which 1,009,832 belong to the urban population and 991,747 comprise of the rural population. This population continues to grow at an annual rate of 3.4 percent.

According to a recent study, 335,408 households in the capital territory cumulatively generate around 1,000 tonnes of solid waste per day.

Islamabad is a central point for many tourists visiting the northern areas and consists of a diverse population since it is a hub for many foreign embassies and other international organizations.⁴³ According to a recent study, 335,408 households in the capital territory cumulatively generate around 1,000 tonnes of solid waste per day. The generated waste is collected by the Capital Development Authority (CDA), which is the designated company for collecting solid waste from residential areas, commercial areas and open spaces; it is then transported to a dumping site located in I-12 for final disposal.⁴⁴ The waste primarily comprises of kitchen waste, commercial, building materials and other scrap material.⁴⁵

2.8.4 PESHAWAR

Peshawar is the capital of Khyber Pakhtunkhwa. The population of Peshawar is 400,000 according to the census of 2017, where only 190,000 is part of the urban population. The increase in population from 1998 to 2017 is 100 percent with an annual growth rate of 3.9 percent.⁴⁶

Peshawar has nearly 236,056 households, which cumulatively generate 1,900 tonnes of solid waste per day.

Waste management comes under the mandate of Water and Sanitation Services Peshawar (WSSP) and Peshawar Development Authority (PDA) where the former is responsible for the entire city while the latter only operates in the area of Hayatabad. Both these public sector entities are responsible for collection and disposal of waste to the three available dump sites of the city i.e. Hazar Khwani (25 acres), Landi Akhoon Ahmad and Hayatabad dumping sites.

2.8.5 FAISALABAD

Faisalabad, previously known as Lyallpur, has grown into an industrial city. With a population of 7,874,790, it stands as the third most populous city of the country. However, due to the lack of urbanization, half of the city still resides in rural areas. The city keeps growing at a rate of 1.9 percent per annum. It has eight towns and a total of 1,225,413 household units. As an industrial and agricultural city its growing business sectors are textile manufacturing, fertilizer, machinery, sugar, oil and pharmaceuticals.⁴⁷

The eight towns of Faisalabad generate about 2,461 tonnes of solid waste on a daily basis.

Generally, like in all other cities, waste chiefly comprises of biodegradable items and a few recyclables such as paper, cardboard, rags and textile waste, and glass / ceramics. Since there is no proper recycling or treatment of waste, most of it makes its way to the open dump located at Muhammada Wala near Central Jail, Jaranwala Road.⁴⁸

2.8.6 GUJRANWALA

Gujranwala is the third-largest industrial centre of Pakistan with a population of 500,000 out of which 290,000 belong to the urban sector, while the rest belong to the rural sector. The population of Gujranwala has grown 78 percent since the last census with an average growth rate of 2.06 percent.

The city is administratively divided into seven towns with 747,214 households generating about 3,125 tonnes of solid waste every day.⁴⁸

This waste is collected by Gujranwala Waste Management Company (GWMC) with an efficiency of 65 percent while the uncollected waste lies along streets and ponds. The waste composition follows the same trend as other cities where the organic fraction is more than 90 percent. Currently, two dumpsites are operational in Gujranwala: Chianwali and Gondlanwala.

2.8.7 MULTAN

Multan, also known as the city of saints, is the cultural as well as the economic centre of southern Punjab. The city is gradually expanding and has a population of around 470,000,⁵⁰ out of which almost half comprise of urbanized communities. It has an annual growth rate of 2.2 percent.

Multan has 760,858 households that cumulatively generate solid waste up to 1,800 tonnes a day.

The waste collection and disposal responsibility mainly lies with private collectors and Multan Waste Management Company (MWMC).

The main dumping ground is called the Habiba Sial Landfill Site (HSLFS), which is spread over an area of 13 acres. After the waste is dumped, scavengers remove recyclable or resellable items including PET bottles. The MWMC changes its designated dumpsites as soon as they fill up and keeps shifting to other selected areas.

2.8.8 MURREE

Murree is a popular mountain resort town

It is a tourist hotspot and people visit this hill station in throngs for its pleasant summers, the snow-capped Himalayan peaks, and many other attractions. The city has a meagre population of 233,471 with a rural population of 207,655 and urban population of only 25,816 people.⁵¹

The total solid waste generated by the city is approximately 60 tonnes a day.

The waste mainly comprises of plastics, paper, textile, glass, metal and food leftovers. The waste is collected by Albayrak in collaboration with the Tehsil Municipal Administration (TMA) and is disposed at a dumping site in Rawalpindi as per the contract between Albayrak and Rawalpindi Waste Management Company (RWMC).

2.8.9 RAHIM YAR KHAN

Rahim Yar Khan (RYK) district is located in southern Punjab. According to the 2017 census the population of the district is 4,814,006 people with an urban-rural split of 103,000 and 378,000 respectively. The current growth rate is of 2.3 percent.⁵²

RYK has transformed into an industrial city with time and now comprises of 290 industrial units, which produces 1,076 tonnes of solid waste a day.

A total of 90 percent of waste collection and disposal is handled by the Tehsil Municipal Administration (TMA), while the rest is handled by private companies. RYK has two dumping sites which are situated at Chak 72 and Gareeb Shah Pull.⁵³

Industries in Rahim Yar Khan mostly manufacture agricultural products and implements, beverages, cement, fans, packages, PVC pipes, soap

and detergent, sulphuric acid, pharmaceuticals, glycerin, pipes, seed processing, sugar and textiles.

2.8.10 GILGIT

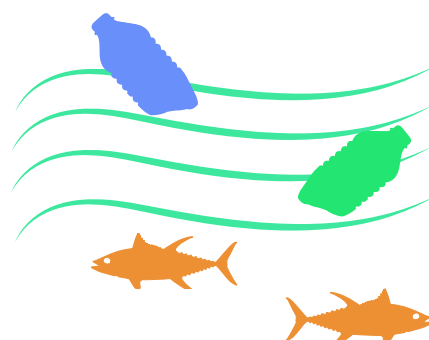
Gilgit is the capital of Gilgit-Baltistan region and a major tourist destination of Pakistan. The district has an estimated population of 330,000 people.

The total solid waste generated is 50 tonnes per day and waste collected is 40-45 tonnes per day.

The waste collection and disposal responsibility lies with Gilgit-Baltistan Waste Management Company (GBWMC). While some of the collected waste is dumped along the Hunza River on Nomal Road, the rest is burned. The open dumping and burning of waste gives rise to a plethora of diseases for the people residing nearby.

2.9 RATIONALE

In Pakistan, PET bottles are used and disposed of copiously. Despite the convenience they provide, PET bottles have drastic consequences for the marine environment and on land. With rapidly increasing plastic pollution and insufficient research in Pakistan, it has become the need of the hour to identify the PET bottle supply chain, quantify the number of bottles ending up in landfills and water bodies, and identify the challenges of the informal recycling sector.



Through this research study, WWF-Pakistan and The Coca-Cola Foundation aim to reduce the leakage of PET bottles into water bodies, improve recovery and recycling of PET bottles and establish a baseline for PET bottles.



2.10 STUDY OBJECTIVES



Conducting a nationwide scoping study to establish a baseline for plastic pollution in Pakistan that will guide national initiatives to address plastic pollution.



Launch a nationwide awareness and communications campaign on plastic pollution to galvanize the public to actively participate in plastic pollution reduction.



Pilot solutions to tackle plastic pollution in Pakistan.



3. STUDY METHODOLOGY

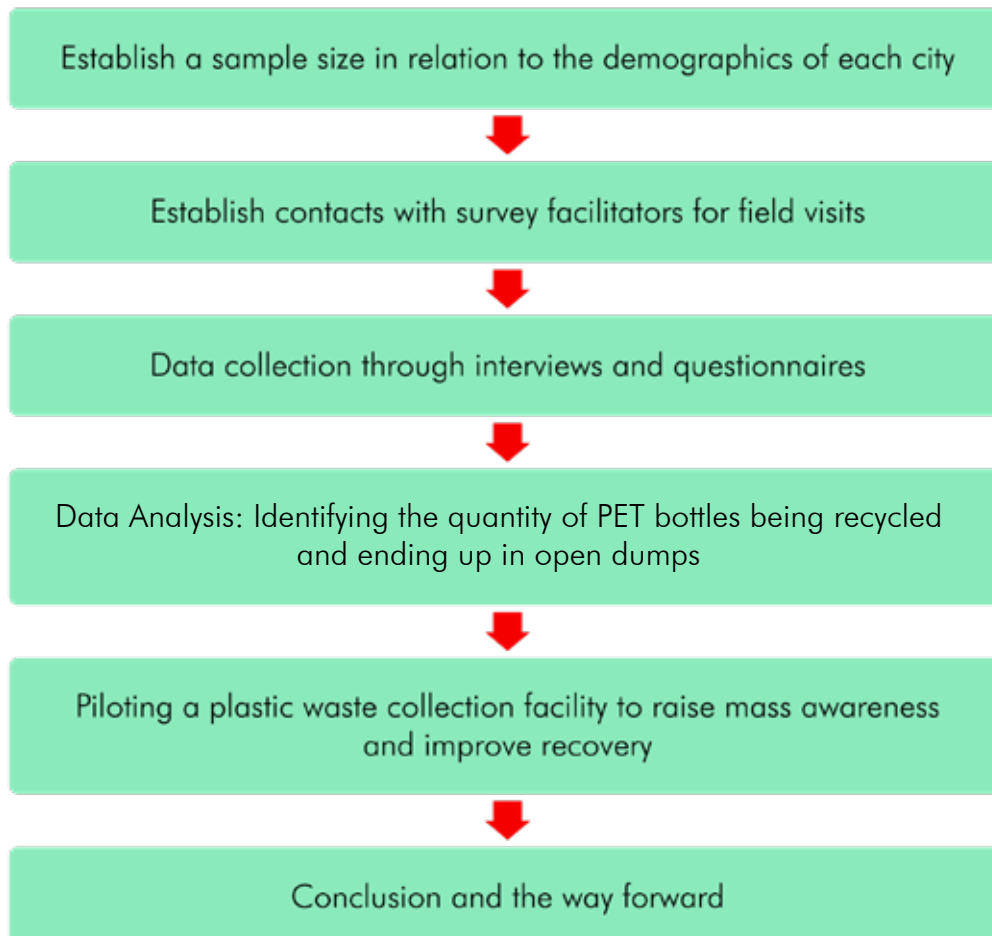


Figure 7: The methodology followed to achieve objectives

3.1 DEFINING THE SCOPE

The following 10 cities were included in the scope of the study, which are presented on the map in Figure 8.

- Lahore
- Karachi
- Islamabad
- Peshawar
- Murree
- Multan
- Gilgit
- Faisalabad
- Gujranwala
- Rahim Yar Khan

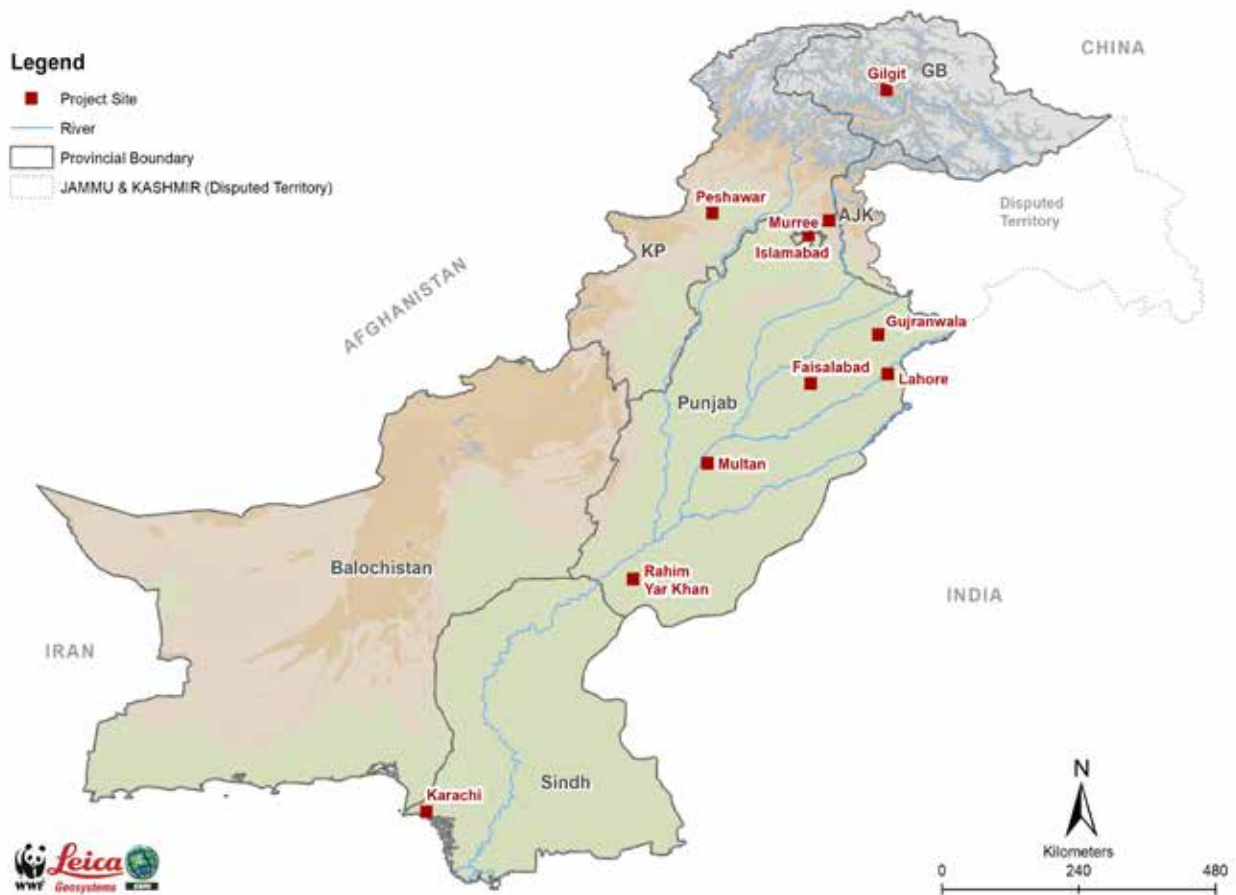


Figure 8: Ten cities of scoping study represented on the map of Pakistan

The selection criteria of the cities and its stakeholders are discussed below.

3.2 SAMPLING TECHNIQUES ADOPTED

Due to unknown population densities of scavengers, junk dealers and recyclers in each city and difficulty of access in certain areas, non-probability sample methods were adopted.

In this case, judgment sampling was used to select the cities for this study. The selection was based on the location of Coca-Cola bottle manufacturing plants, population density and the level of tourism. Furthermore, the sample size of households, waste management companies and commercial areas were selected based on the judgment of the population size of each city.

3.2.1 JUDGMENT OR PURPOSIVE SAMPLING

This is a sampling technique in which a researcher relies on his/her own judgment when choosing members of a population for a study as the population characteristics may be unknown. In this sampling methodology, the researcher selects the sample through judgment which will give the desired or most accurate information. The target population in this research normally has background information that fits the study objective.

Judgment sampling was used to select the cities for this study.

3.2.2 CONVENIENCE SAMPLING

This sampling method is a type of non-probability sampling, which is dependent on units that are easily available from the population, which can conveniently participate in the study. Convenience sampling is especially useful when the population is so large that every unit cannot be included in the investigation under study due to various limitations.

Convenience sampling was used while conducting visits to various stakeholders.

They were approached based on their willingness to participate in this study. The numbers of scavengers, junk dealers and recyclers interviewed were also based on convenience sampling as the informal sector is widely scattered throughout the cities and all were not always willing to provide required information.

The sample size for each stakeholder group in the ten selected cities is provided in detail in Table 2.



| | Household | | | | Commercial | | | Recyclers | Junk Dealers | Scavengers | Waste Management Companies |
|----------------|---------------|--------|--------------|-------------|------------|--------------|-------------|-----------|--------------|------------|----------------------------|
| | Civic Society | Hotels | Institutions | Restaurants | Hotels | Institutions | Restaurants | | | | |
| Lahore | 500 | 50 | 500 | 50 | 5 | 10 | 15 | 5 | 25 | 61 | 3 |
| Karachi | 700 | 60 | 500 | 60 | 6 | 10 | 20 | 2 | 25 | 51 | 5 |
| Islamabad | 200 | 40 | 300 | 40 | 4 | 6 | 10 | 0 | 22 | 33 | 2 |
| Murree | 25 | 35 | 150 | 35 | 7 | 3 | 7 | 1 | 2 | 4 | 1 |
| Peshawar | 70 | 10 | 150 | 10 | 2 | 5 | 5 | 1 | 4 | 17 | 2 |
| Multan | 400 | 30 | 200 | 30 | 3 | 6 | 10 | 2 | 10 | 19 | 1 |
| Gilgit | 70 | 15 | 90 | 15 | 3 | 3 | 5 | 1 | 3 | 15 | 1 |
| Gujranwala | 200 | 30 | 150 | 30 | 3 | 3 | 5 | 2 | 1 | 12 | 1 |
| Rahim Yar Khan | 300 | 15 | 160 | 15 | 3 | 4 | 4 | 2 | 5 | 10 | 1 |
| Faisalabad | 500 | 40 | 250 | 40 | 4 | 3 | 6 | 2 | 9 | 12 | 1 |
| TOTAL | 2965 | 325 | 2450 | 325 | 40 | 53 | 87 | 18 | 106 | 234 | 18 |

Table 2: Sample size for each stakeholder in all cities

3.3 RESEARCH METHODS

For this study, two classic research tools were adopted: questionnaires and interviews. Questionnaires for the six different categories of stakeholders were drafted and consisted of both open-ended and closed-ended questions.

Questionnaire categories included:

HOUSEHOLDS

Household questionnaires were distributed to students and faculties of institutions, employees of restaurants and hotels, and any citizens present in public spaces such as malls.

The aim was to assess the amount of PET consumed in households, their awareness level on plastic pollution and their willingness towards tackling it.

COMMERCIAL SECTOR

Commercial questionnaires were drafted and distributed to the commercial sector such as the management of hotels, institutions and restaurants to determine the number of PET bottles purchased. Interviews were also conducted with the commercial sector to extract information through more in-depth and open discussions.

FORMAL SECTOR

Formal sector questionnaires were filled out by public and private waste management companies after a quick interview.

SCAVENGERS, JUNK DEALERS AND RECYCLERS

Information from the informal sector i.e. scavengers, junk dealers and recyclers was extracted mainly through interviews. This was done due to the nature of the stakeholders. In order to ease their hesitation and reluctance, it was imperative to have an informal and free interaction to gain their trust. Questions from the surveys were also asked through these interviews and data was acquired on the amount of PET collected and recycled, issues associated with this business and assessing possibilities of future collaboration.

3.3.1 QUESTIONNAIRES

Questionnaires for the six different categories of stakeholders were drafted and consisted of both open-ended and closed-ended questions. Questionnaires were chosen because they are a reliable and quick method to collect information from multiple respondents in an efficient and timely manner. This is especially important when it comes to large projects, with several complex objectives, where time is one of the major constraints. This study was no exception and questionnaires were used to reach multiple respondents within several weeks. A general disadvantage of questionnaires, however, is their fixed and strict format, which eliminates the possibility for more in-depth or abstract observations. The questionnaires in this study provided linear and clear results, but many elements from the research were left uncovered.

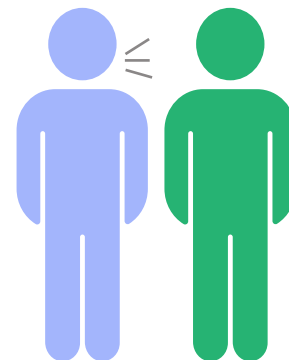
3.3.2 INTERVIEWS

In order to cover more abstract aspects of research, structured interviews consisting of

several questions were chosen, which were conducted with representatives of each participant group. Interviews are often used as a complementary research method in social sciences because they give the opportunity for a more extensive, open and informal discussion and free interaction between the interviewer and interviewee. Despite being a drawback because it produces subjective results, the flexible format of interviews was a major advantage for this study as interviews create a memorable experience for the interviewee, allowing for a more stable and well-established connection. Furthermore, their flexible format contributed to a deeper understanding of the processes involved in PET bottle collection and recycling.



Questionnaires



Interviews

3.4 ESTABLISHING CONTACT WITH STAKEHOLDERS FOR SURVEY FACILITATION

Primarily, a huge database of all stakeholders was created using internet searches. This database aided in finding contact details of only official and registered stakeholders, which included institutions, waste management companies, restaurants and hotels. Contact was established with the concerned departments via email and phone calls. After getting the relevant personnel acquainted with the purpose of the research and attaining the permission to conduct the research within their facilities, a meeting was arranged, questionnaires were distributed and interviews were conducted.

Since scavengers, junk dealers and recyclers belong to the informal sector, their companies or names are not registered online and due to severe poverty, most of them do not own cell phones. Hence, physical visits to their premises, with the facilitation of the operations team of waste management companies, were conducted without informing the stakeholders or arranging meetings. The purpose and intent of the project was conveyed to them before conducting the interviews or filling the questionnaires.



Figure 9: Garmin GMAP 62S

3.5 DATA ANALYSIS

3.5.1 MARKING GPS COORDINATES

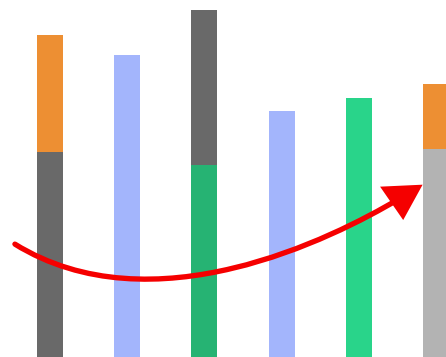
The GPS coordinates were marked using the Garmin GMAP device model 62S. This is a user-friendly hand-held, long-lasting device that allows the user to navigate anywhere with ease.⁵⁴ Figure 9 shows a picture of the model selected.

3.5.2 MAPPING GIS COORDINATES

The marked coordinates were exported on ArcGIS, an interactive mapping tool used to create maps according to each city and stakeholder.⁵⁵ Clusters were formed for households, while the locations of all other stakeholders were pinned onto the map.

3.5.3 ANALYSIS ON SPSS

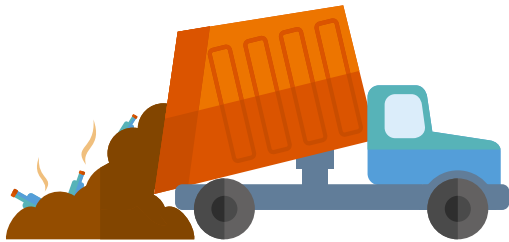
Thematic analysis was used to examine questionnaires. Due to the large number of respondents and the diverse design of questionnaires, the statistical software, SPSS, was used to ease entry and obtain multivariable graphs. The results from the questionnaires were presented in the form of tables and charts.





4. SURVEY FACILITATION

Visits to the PET supply chain (scavengers, junk dealers and recyclers) were mainly facilitated by the public waste management companies in each city. A brief overview of their operational jurisdiction, waste handling capacity and disposal mechanism is given below.



4.1 SINDH SOLID WASTE MANAGEMENT KARACHI (SSWM)

The SSWM aims to streamline waste management operations in Karachi as well as other cities of Sindh and to integrate scavengers into the formal SSWM sector.

Existing landfills under its domain: None

Proposed number of landfills: three landfills for Karachi and a total of six garbage transfer stations.⁵⁶

4.2 WATER AND SANITATION SERVICES PESHAWAR (WSSP)

The Water and Sanitation Services Peshawar (WSSP) is a public urban utility in Peshawar. It has become the first water and sanitation company in Pakistan to have urban water and sanitation services delivered by ring-fenced, professionally managed and corporate governed utility.⁵⁷

- Waste handling capacity: almost 70 percent.
- Area under jurisdiction: 45 urban and 22 semi-urban union councils.
- Designed landfill: open dumping at an abandoned water treatment plant.

4.3 GUJRANWALA WASTE MANAGEMENT COMPANY (GWMC)

Gujranwala Waste Management Company (GWMC) works to improve the waste management system and services for the city of Gujranwala. Its goal is to maximize resource recovery and recycling efficiency to ensure a safe and green environment, even at landfill sites.

- Collection efficiency: 65%
- Area under jurisdiction: 64 union councils.
- Tracker on 134 operational vehicles also automatic Vehicle Trip Counting System (VTCS).⁵⁸

65 %

waste collection efficiency
of GWMC

64

union councils of urban
Gujranwala

134

vehicles with tracker as
well as automatic
Vehicle Trip Counting
System (VTCS)

4.4 ALBAYRAK WASTE MANAGEMENT COMPANY, MURREE

Albayrak Waste Management Company is a subsidiary of Albayrak Group, a Turkish company. It currently collects waste in three cities, i.e. 72 UCs of Lahore, 63 UCs of Rawalpindi and UC-49 of Murree.

It is currently working in collaboration with Tehsil Municipal Authority (TMA) for the collection, transportation and disposal of waste in Murree.

Collected solid waste is directly transferred via compactors to Rawalpindi Waste Management Company's (RWMC's) dumpsite. A contract was signed with the RWMC which allows the landfill site of the city to be used to dispose of waste generated in Murree.⁵⁹

4.5 LAHORE WASTE MANAGEMENT COMPANY (LWMC)

The Lahore Waste Management Company (LWMC) is a public sector company overseeing waste management in the city of Lahore. It has subcontracted/outsourced the task to two Turkish companies, namely Albayrak and Ozpak, to cover areas in the city where they are mainly responsible for waste collection and transportation services.

- Door-to-door collection of waste.
- Collection and removal of waste to approved disposal sites.
- Mechanical/manual sweeping of main and arterial roads, streets and squares with vacuumed vehicles.
- Presently, about 1,500 km of roads are mechanically swept along with washing of 100 km daily. More than 80 percent waste collection efficiency has been achieved by the contractor in its respective zones.⁶⁰

4.6 FAISALABAD WASTE MANAGEMENT COMPANY (FWMC)

The Faisalabad Waste Management Company (FWMC) was created under Section 42 of the Companies Ordinance; it provides services in 113 union councils (four towns i.e. Madina Town, Iqbal Town, Jinnah Town, Lyallpur Town) of the city district Faisalabad.

The FWMC currently operates at a collection rate of 65 percent. Services include door-to-door and container-based collection. Before the establishment of FWMC, CDGF was operating at a collection rate of 40 percent.

Waste drums have been installed along six primary drains to avoid waste disposal inside drains by the general public.⁶¹

4.7 CAPITAL DEVELOPMENT AUTHORITY (CDA), ISLAMABAD

The Capital Development Authority (CDA) was established in 1960 as a public corporation responsible for providing municipal services in

the Islamabad Capital Territory (ICT). Within the CDA, the Directorate of Sanitation has the functional responsibility for sanitation and management of solid waste within the municipal limits of Islamabad.

Services include collection, transportation and safe disposal of solid waste collected from residential and commercial areas to a designated landfill site.

The Islamabad CDA has 192 dustbins/collection points and 43 vehicles to shift waste to the dumping site with 1,603 sanitary workers. It is currently openly dumping waste in Sector I-12.⁶²



4.8 GILGIT-BALTISTAN WASTE MANAGEMENT COMPANY (GBWMC)

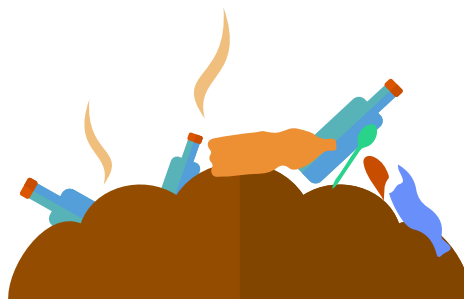
The Gilgit-Baltistan Waste Management Company (GBWMC) is only responsible to collect municipal waste from Gilgit town. Other district headquarters are not in GBWMC's jurisdiction and municipal committees are the key agencies for the collection and disposal of waste in those locations.

A sanitary landfill site is currently under construction and municipal solid waste is dumped at the proposed sanitary landfill. Gilgit Development Authority (GDA) is constructing the sanitary landfill site; upon its completion, it will be delegated to GBWMC for operation and management.⁶³

4.9 TEHSIL MUNICIPAL ADMINISTRATION (TMA) RAHIM YAR KHAN

The solid waste collection capacity of the district governments is far less than the volume

generated. In Rahim Yar Khan the disposal of solid waste is mainly done in the form of open dumping at four points within the city.



About 60 % of municipal solid waste is collected while the rest remains unattended along roadside points within the city.



4.10 MULTAN WASTE MANAGEMENT COMPANY (MWMCO)

The Multan Waste Management Company was established in 2013 in order to effectively manage, regulate and control solid waste in Multan city under Section 42 of the Companies Ordinance. It currently has a collection efficiency of 60 percent and has no centralized landfill site to discard the collected waste. Open dumpsites are located in various areas throughout the city and are replaced when the previous ones exceed their capacity.



5. RESULTS AND DISCUSSION

5.1 PET WASTE GENERATION IN EACH CITY

During this study, questionnaires based on usage of PET were filled by individuals. This was done to gauge the overall percentage of PET bottles in the waste generated. In each city, the average usage of all individuals per month was calculated and extrapolated according to the population density. This value was then multiplied with the weight of an empty bottle* to provide a figure in kilograms, as depicted in Table 3.

*For this study, it was assumed that people consumed 0.5 litre bottles (weighing an average of 12 g without the cap) and 1 litre bottles only (weighing an average of 30 g without the cap). The average weight was calculated and came out to be 21g or 0.021kg.



PET WASTE
generation
in each city

| S. No | City | Population | Waste generation per month (in kg) | Waste generated per capita per month (in kg) | Amount of PET waste generated per capita per month (in kg) | Amount of PET waste generated by entire population per month (in kg) |
|-------|----------------|------------|------------------------------------|--|--|--|
| 1 | Lahore | 11,126,285 | 185,064,720 | 16.63310979 | 0.3994614 | 4444521.383 |
| 2 | Islamabad | 2,001,579 | 27,215,400 | 13.5969652 | 0.346816 | 694179.6225 |
| 3 | Karachi | 16,009,988 | 334,205,112 | 20.87478841 | 0.346783 | 5551991.669 |
| 4 | Peshawar | 4,269,079 | 51,709,260 | 12.11250951 | 0.394288 | 1683246.621 |
| 5 | Gilgit | 216,760 | 1,360,770 | 6.277772652 | 0.429009 | 92991.99084 |
| 6 | Rahim Yar Khan | 4,814,006 | 29,283,770 | 6.083035709 | 0.4396389 | 2116424.249 |
| 7 | Murree | 233,471 | 1,632,924 | 6.994119184 | 0.369704 | 86315.16258 |
| 8 | Faisalabad | 7,874,790 | 66,977,099 | 8.505255302 | 0.455874 | 3589912.016 |
| 9 | Gujranwala | 5,014,196 | 85,048,125 | 16.961468 | 0.343948 | 1724622.686 |
| 10 | Multan | 4,745,109 | 48,987,720 | 10.3238345 | 0.494916 | 2348430.366 |

Table 3: PET waste generated in each city

Figure 10 provides a graphical representation of the PET waste generated in each city per month. The chart shows that Karachi has the highest PET generation per month at almost 5,551,992 kg. This can be accounted for by its high population density.

Lahore is the second-highest PET waste generator with almost 4,444,521 kg. The lowest PET generators are Murree and Gilgit due to their low population densities.

5,551,992 KG

PET generated
per month in Karachi

4,444,521 KG

PET generated
per month in Lahore

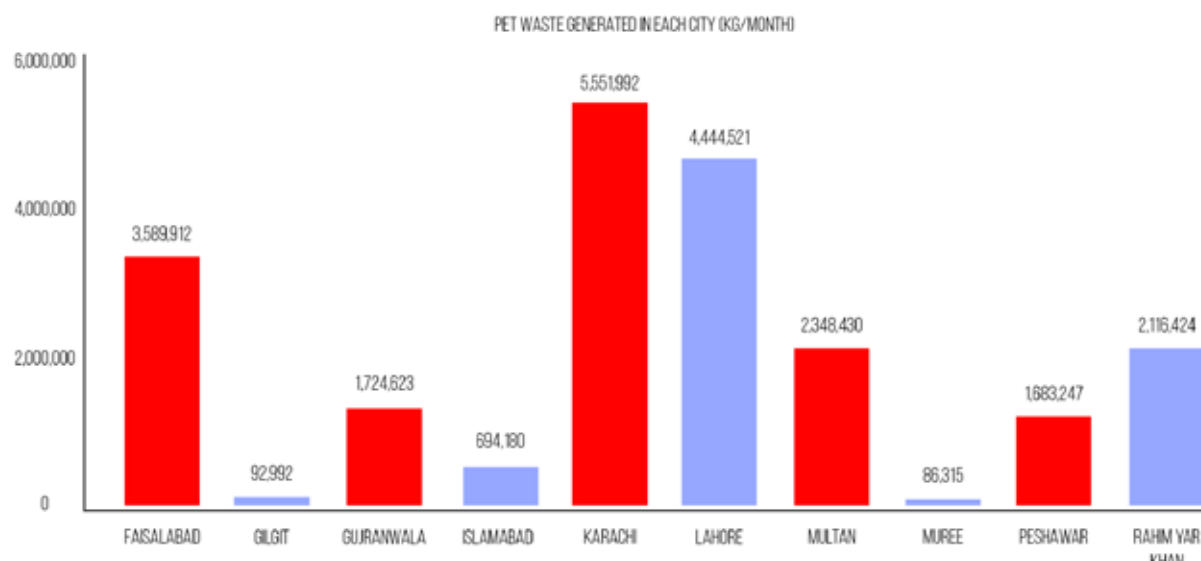
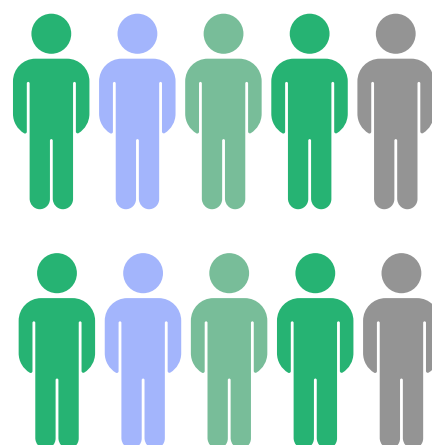
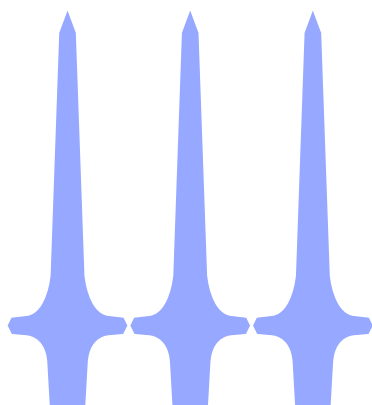


Figure 10: PET generated per month in each city

5.2 CITY-WISE REPRESENTATION OF RESULTS

5.2.1 KARACHI

Visits to Karachi were carried out in the month of February and almost 1,450 people from households, the commercial sector and the PET supply chain were interviewed.



1,450 people were interviewed

5.2.1.1 WASTE MANAGEMENT COMPANIES

Public and private waste management companies (WMCs) in Karachi, including Sindh Solid Waste Management Board (SSWMB), Zephyr Waste Solutions, Alico Waste Experts and Changyi Kangjie were interviewed and were asked to fill out questionnaires. Their responses are presented in the following results and their locations are marked in Figure 11.



Figure 11: WMCs in Karachi

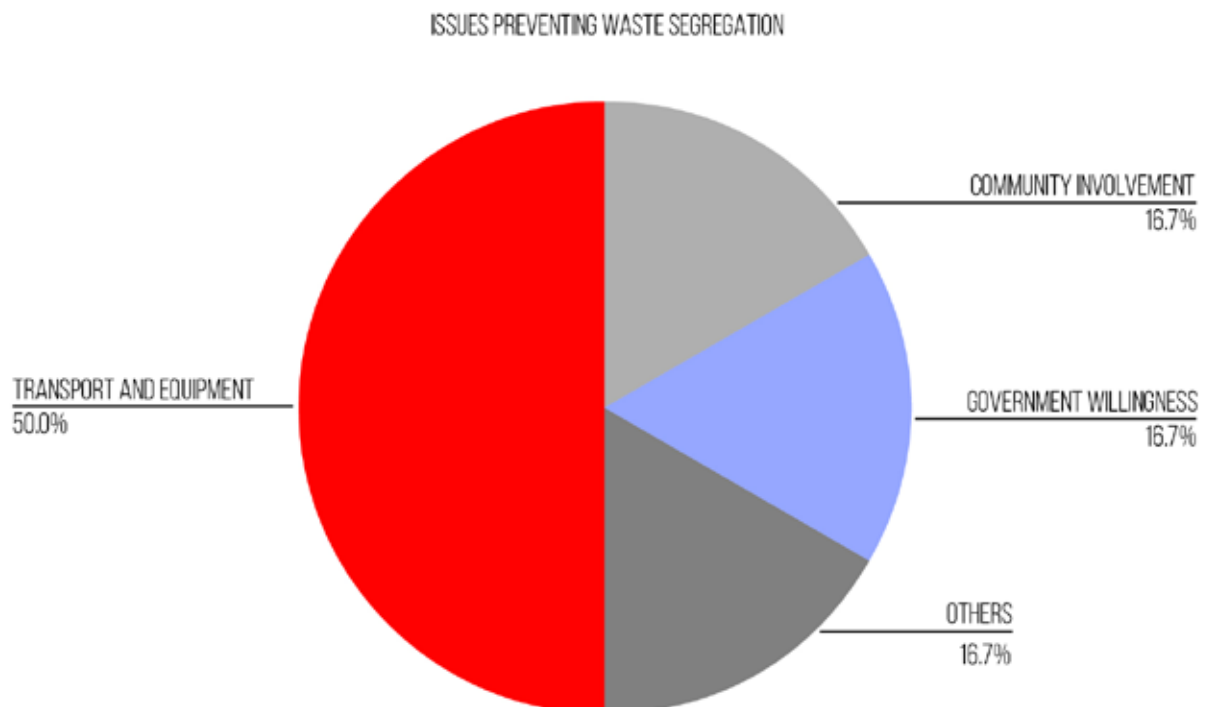


Figure 12: Issues hindering WMCs from segregating waste in Karachi

According to Figure 12, the WMCs lack of technology accounts for almost 50 percent of the issues that prevent waste segregation. Some also believe that lack of community representation is a big issue.

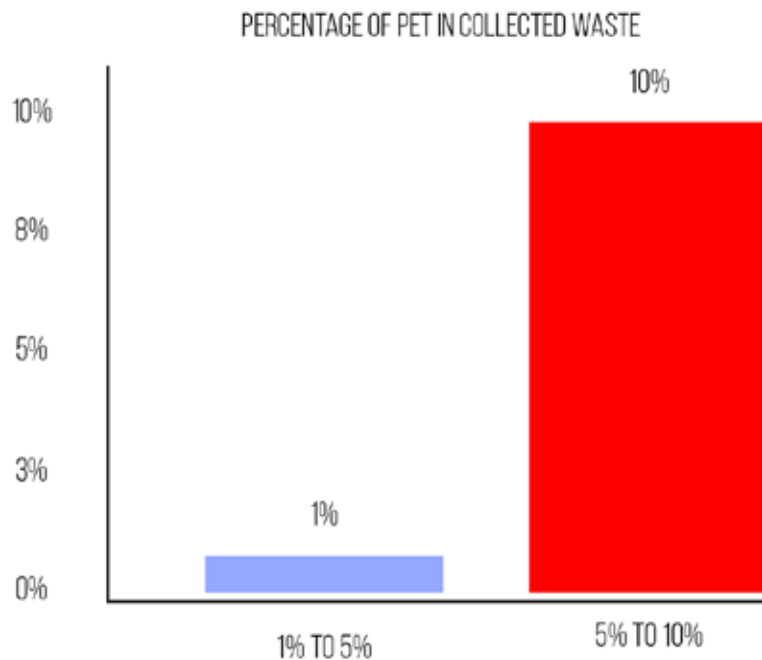
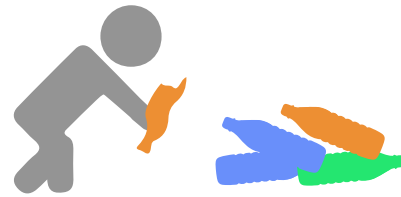


Figure 13: Approximate amount of PET left in waste collected in Karachi

According to Figure 13, almost one percent to 10 percent of PET remains in the waste collected in Karachi. The majority, of WMCs, however, claimed that almost 10 percent of PET remains.

component was PET bottles as claimed by 20 percent of the respondents, shown in Figure 15.

5.2.1.2 HOUSEHOLDS

Due to the dense population in Karachi, almost 1,300 individuals were approached to fill out the survey; their localities are mentioned in Figure 14. These survey questionnaires aimed to obtain information about the current waste disposal practices of citizens, gauge their awareness level about plastic pollution and assess their willingness to segregate used PET bottles for recycling.

According to the citizens of Karachi, the major component of plastic waste mainly consists of plastic bags, whereas the second major



The major component of plastic waste is plastic bags.



The second major component of plastic waste is PET bottles.

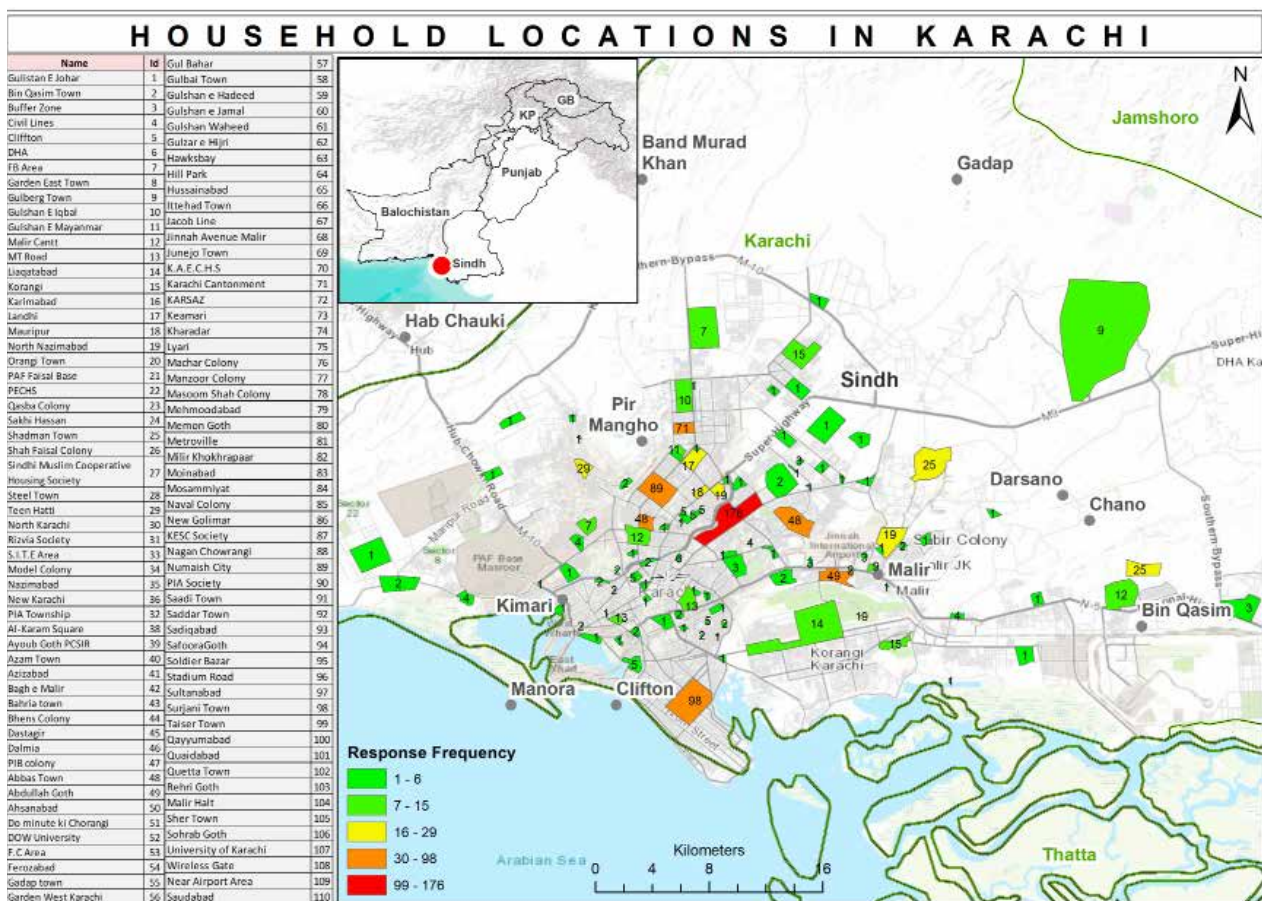


Figure 14: Localities of households in Karachi

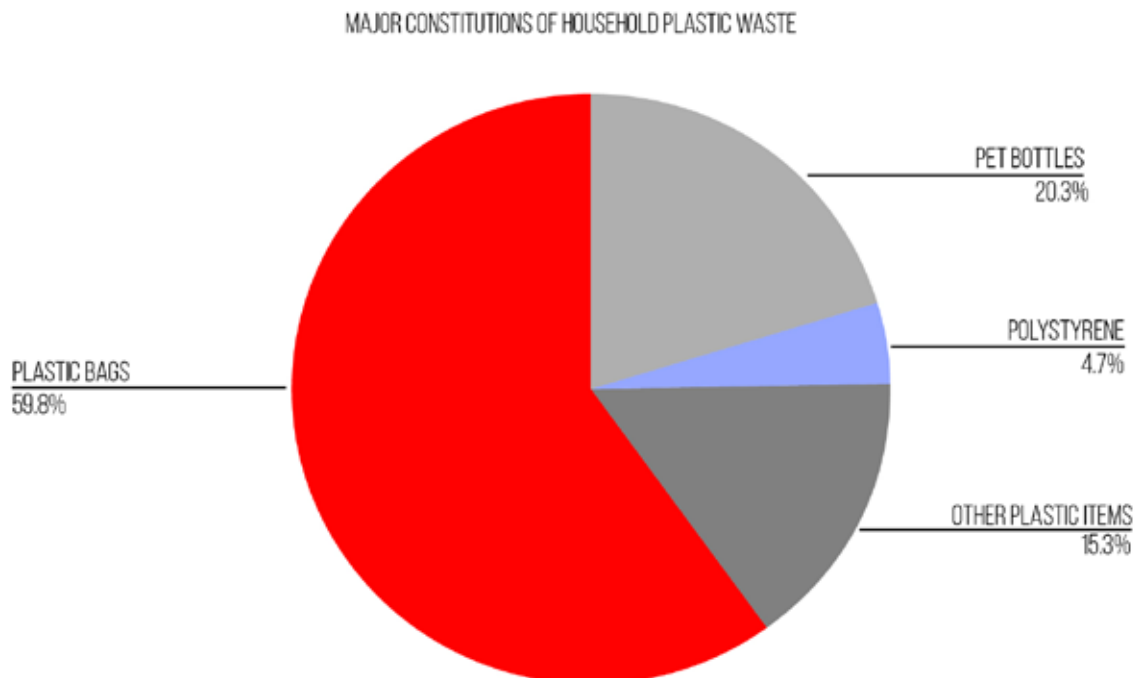


Figure 15: Major constituents of household plastic waste in Karachi

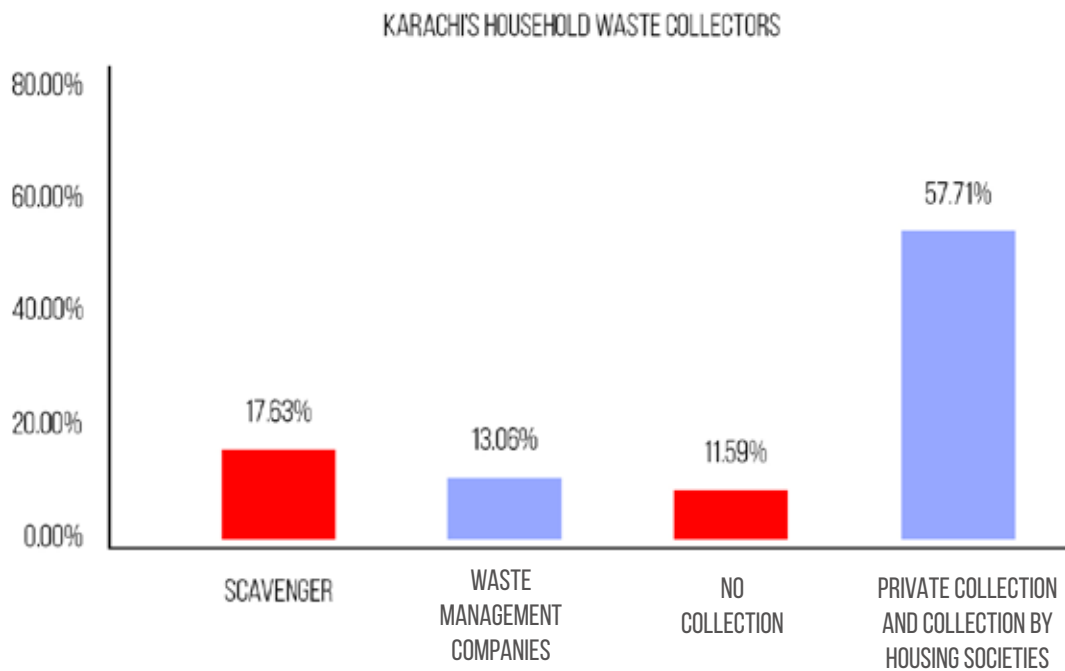


Figure 16: Major waste collectors in Karachi's households

About 58 percent of households have private waste collectors picking their waste, while scavengers collect almost 18 percent of household waste as shown in Figure 16.



58 % of households have private waste collectors picking up their waste.

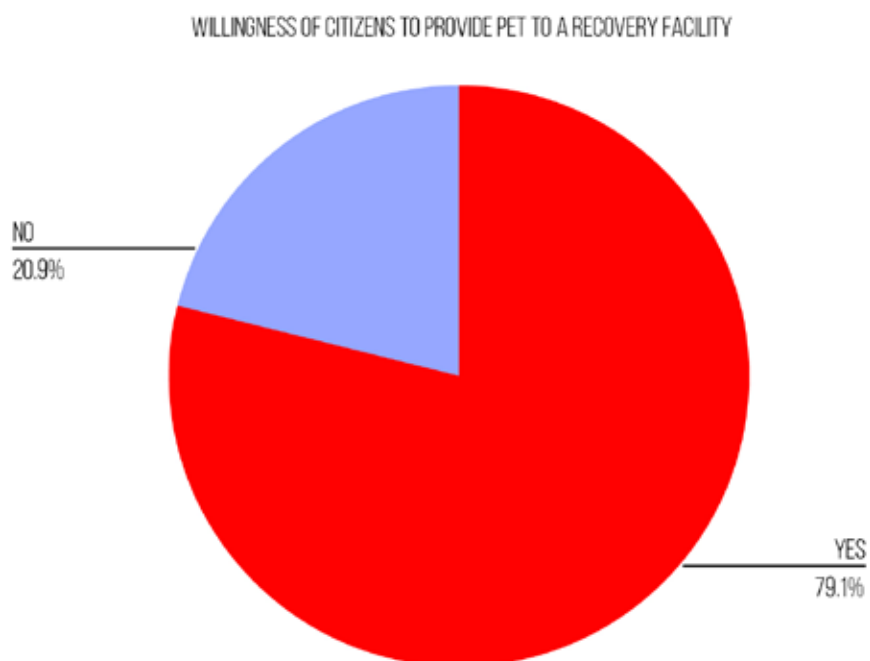


Figure 17: Willingness to provide PET to a recovery facility

According to Figure 17, almost 79 percent of citizens in Karachi were willing to provide their PET to a plastic recovery facility.

79 %

of Karachi’s citizens were willing to provide PET to a recovery facility.

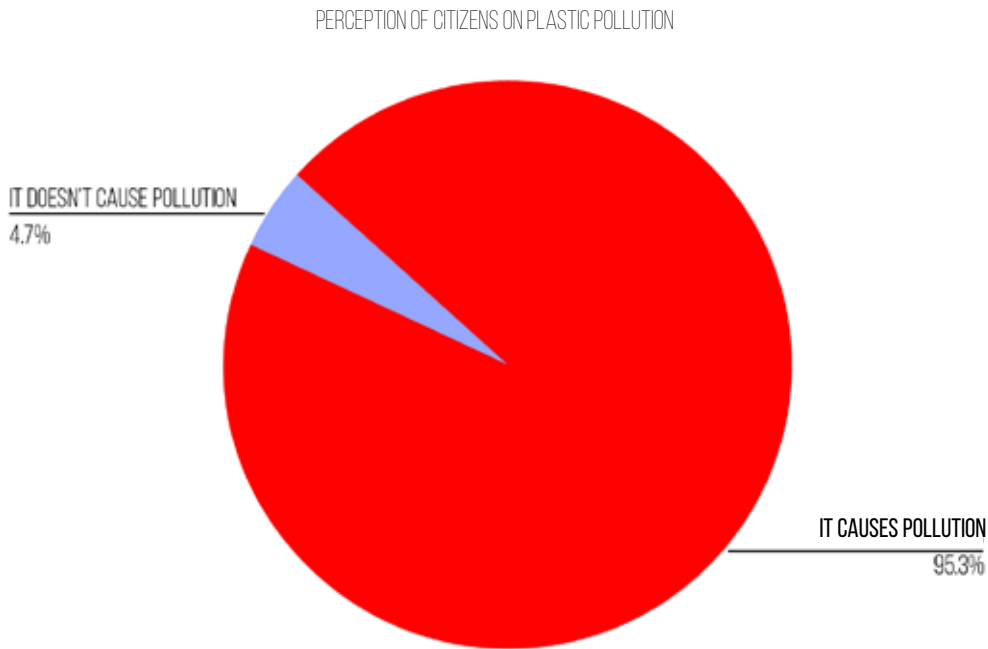


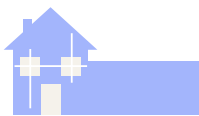
Figure 18: Perception of citizens on plastic pollution on land and water

According to Figure 18, 95 percent of participants agreed that poor disposal of plastic results in land and water pollution.



6 HOTELS

This shows that the majority of Karachi’s population is aware of the implications of poor management of plastic waste.



10 INSTITUTIONS

5.2.1.3 COMMERCIAL SECTOR

Almost six hotels, 10 institutions and 20 restaurants were visited and their management interviewed in the month of March 2019. The selected sites are mapped in Figure 19.



20 RESTAURANTS

COMMERCIAL COMMUNITY IN KARACHI

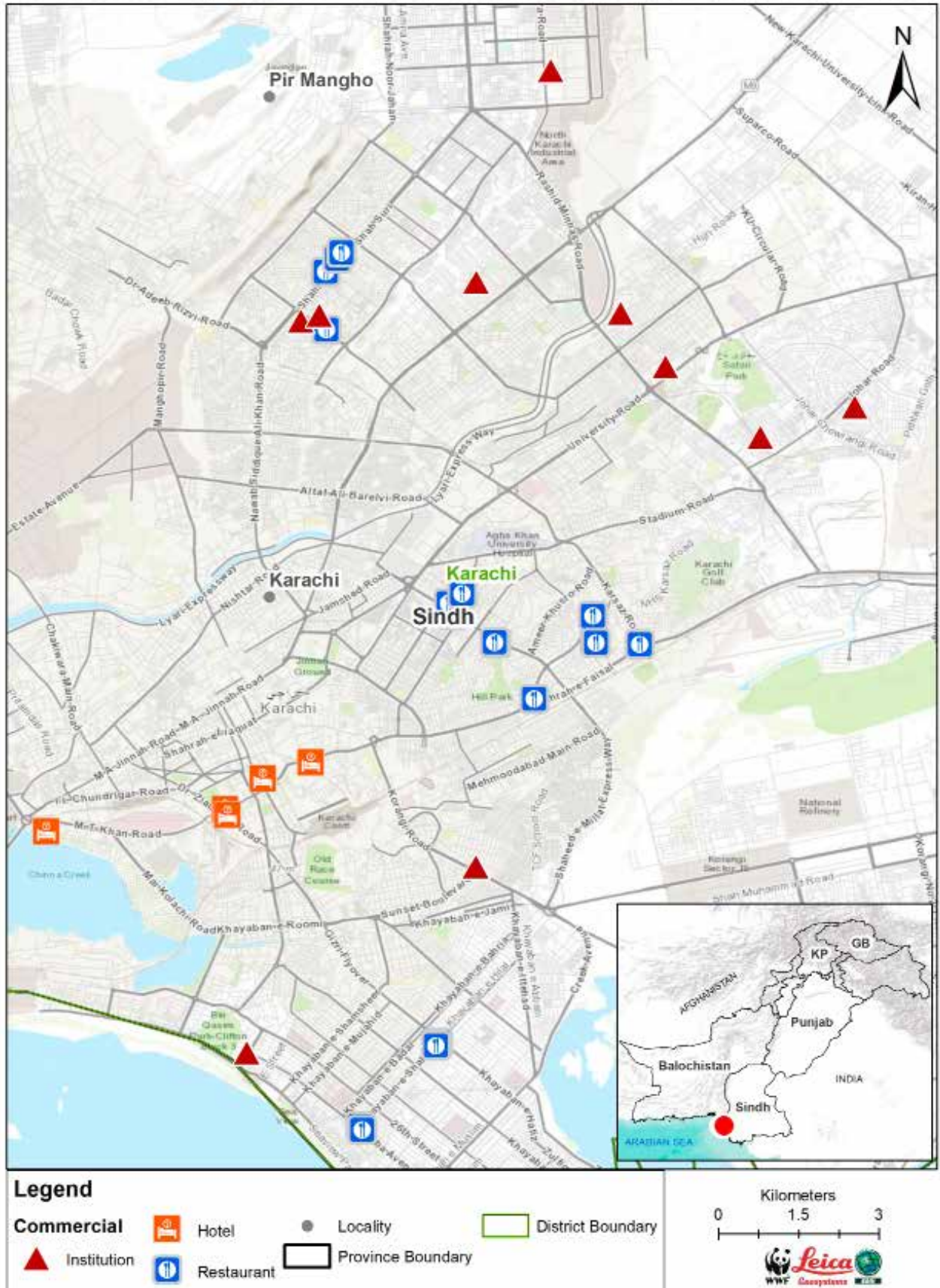


Figure 19: Commercial sector, Karachi

RESPONSE OF COMMERCIAL SECTOR ON SELLING PET TO JUNK DEALERS

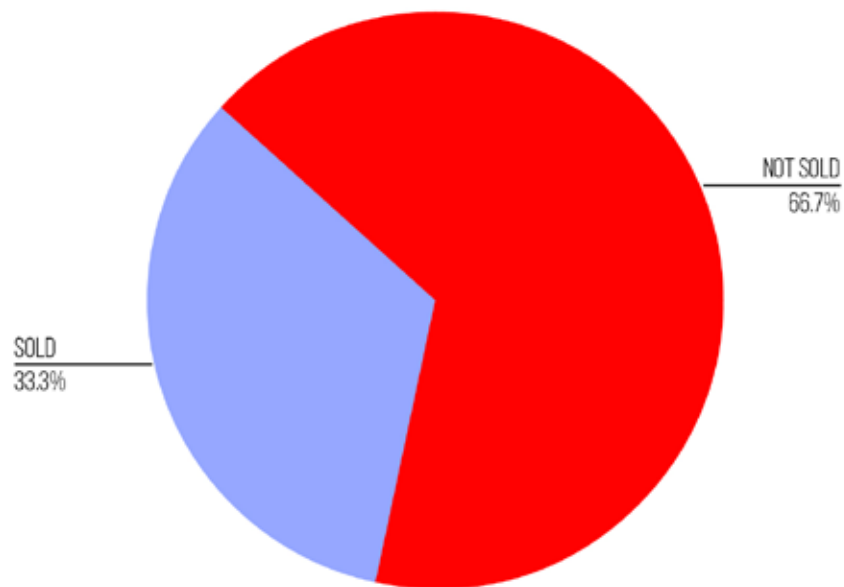


Figure 20: Response of Karachi's commercial sector on whether they sell PET to junk dealers

It was found that almost 67 percent of Karachi's commercial sector did not sell their waste, whereas approximately 33 percent sold their waste to junk dealers, as shown in Figure 20.

33 %

of Karachi's commercial sector did sell their waste.

AVERAGE PET WASTE GENERATED (KG/MONTH)

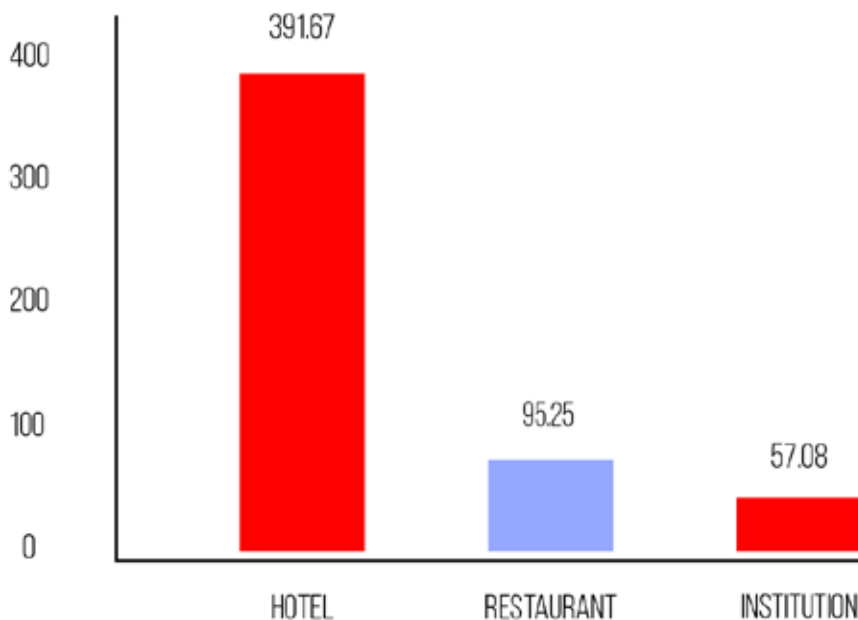


Figure 21: Monthly average PET waste generation by each commercial sector of Karachi

According to Figure 21, on average, about 392 kg of PET is generated per hotel per month in Karachi, while a restaurant and institution generates only 96 kg and 57 kg respectively.

5.2.1.4 SCAVENGERS

Fifty scavengers in Karachi were interviewed in February 2019. The main localities where Karachi's scavengers reside or pick up waste are Railway Colony, Cantt, Akhtar Colony and Jackson Bazar. The locations have been mapped in Figure 22.



50 scavengers were visited in Karachi

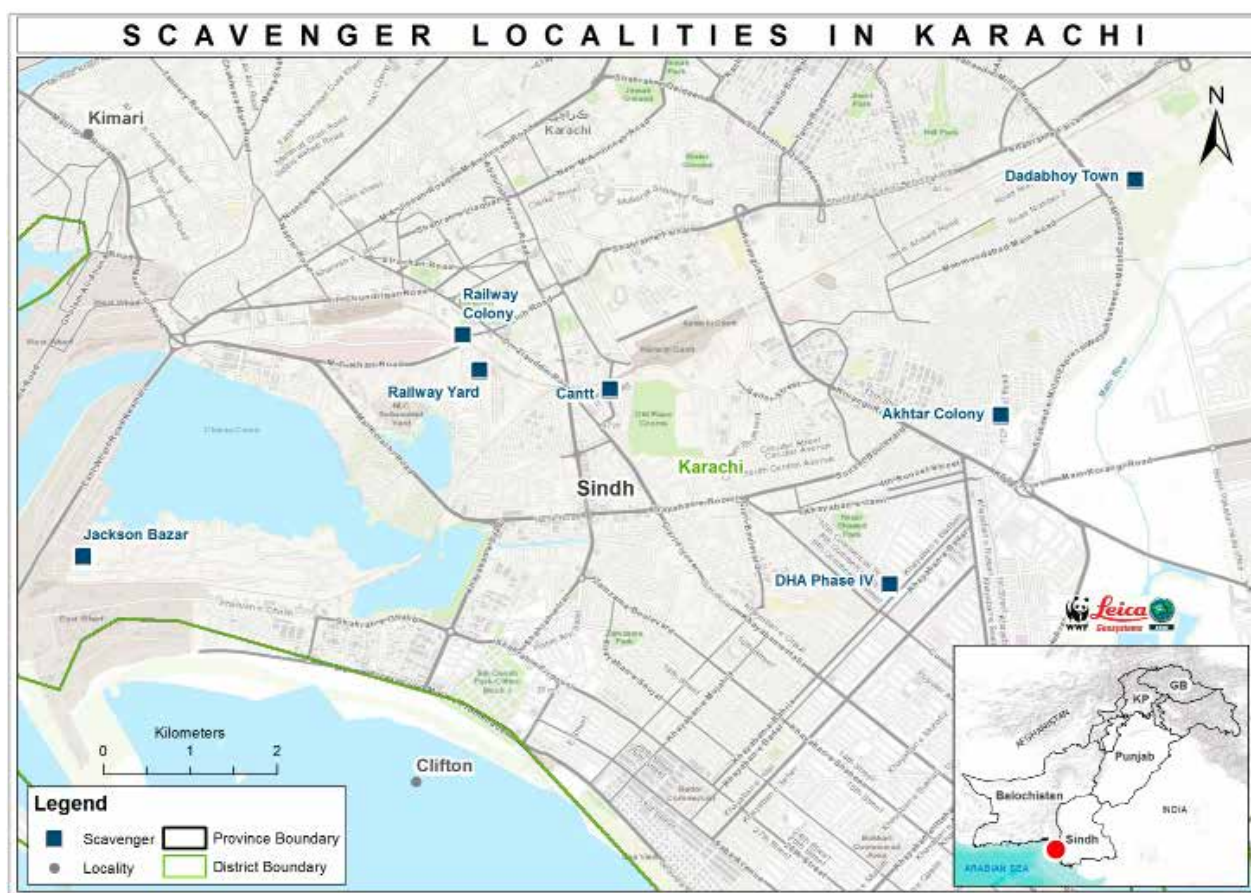


Figure 22: Scavenger localities in Karachi

Scavengers were interviewed in order to assess the quantity of PET bottles they collect, the challenges they face in the field of work and their willingness to work in a more formal set up.



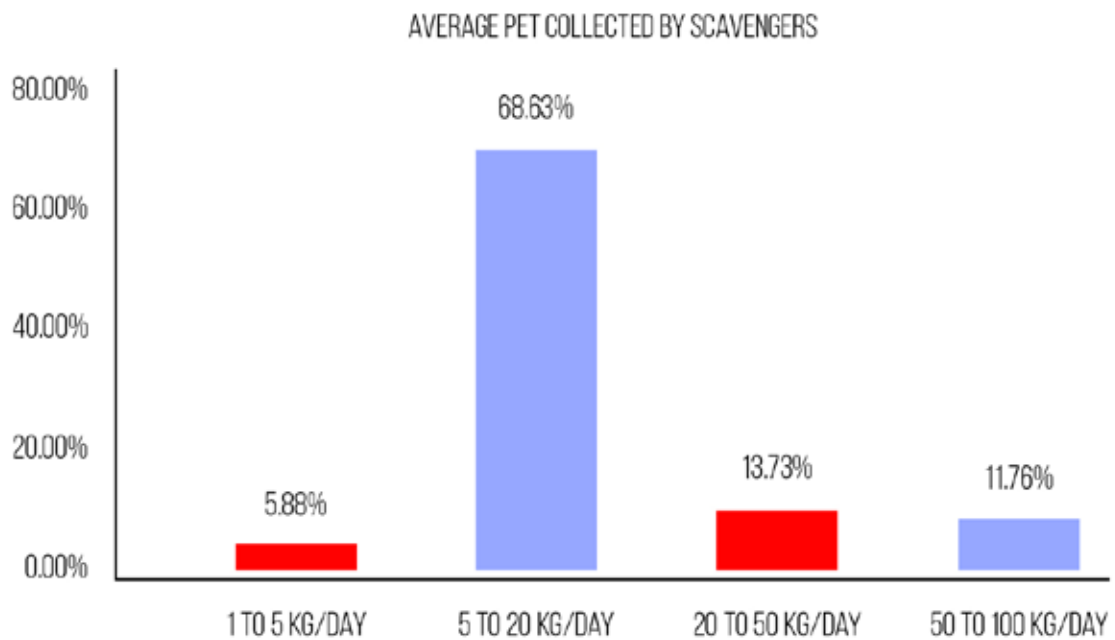


Figure 23: Average range of PET collected by scavengers per day in Karachi

Figure 23 represents that on average, most scavengers collect around 5 to 20 kg of PET bottles per day from open dumps and from collection bins placed by WMCs in Karachi.

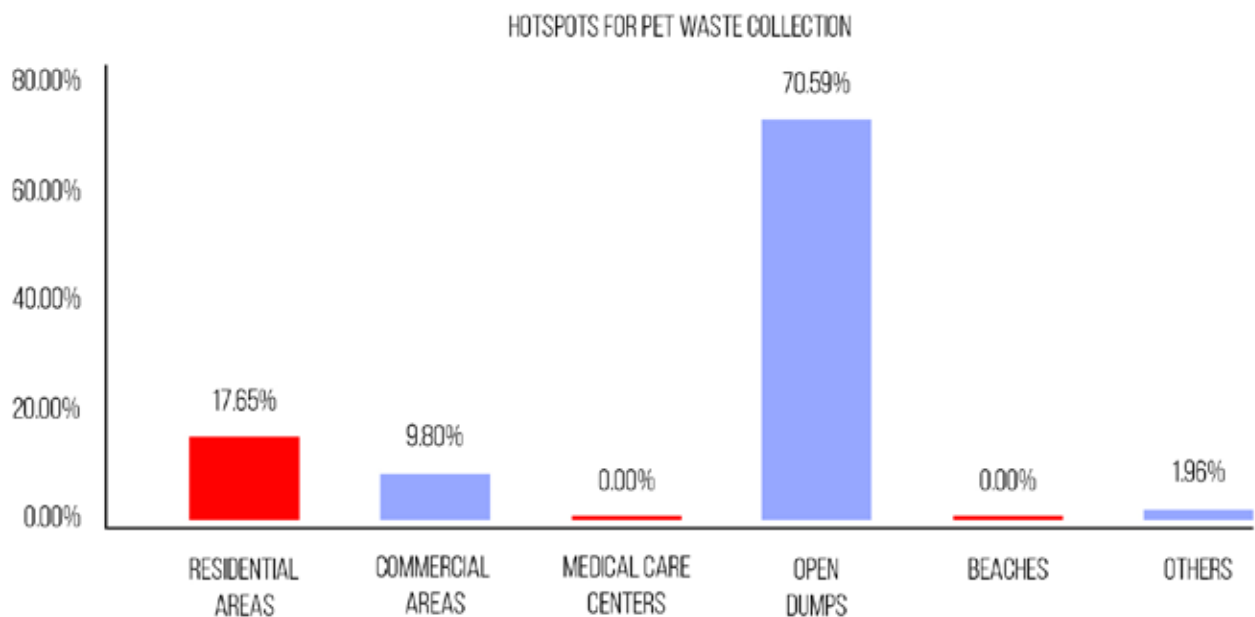


Figure 24: Hotspots in Karachi for PET collection

A total of 71 percent of scavengers collected waste from open dumps while a small percentage collected waste from residential areas, as shown in Figure 24. According to them, they sell these bottles to a junk dealer/recycler at a rate of PKR 25 per kg to PKR 45 per kg.



Bottles are sold at a rate of PKR 25 per kg to PKR 45 per kg.

WILLINGNESS OF SCAVENGERS TO PROVIDE PET TO A RECOVERY FACILITY

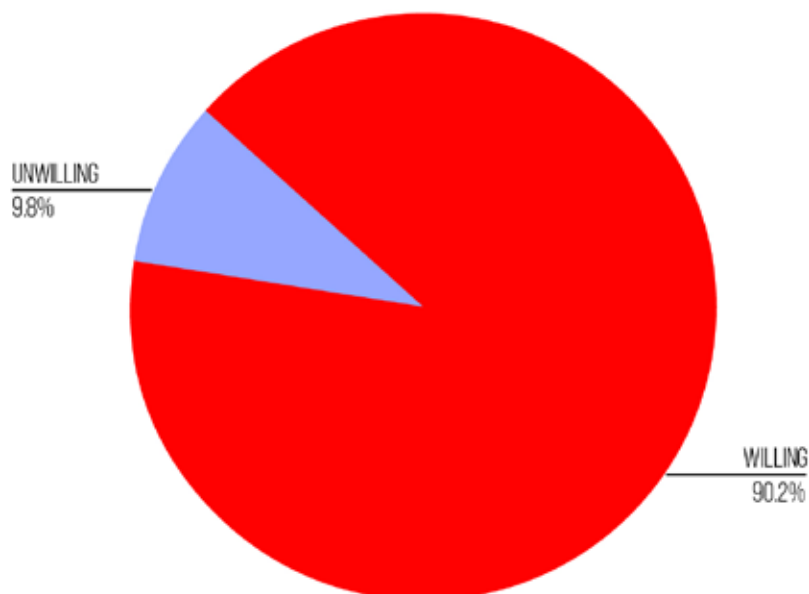
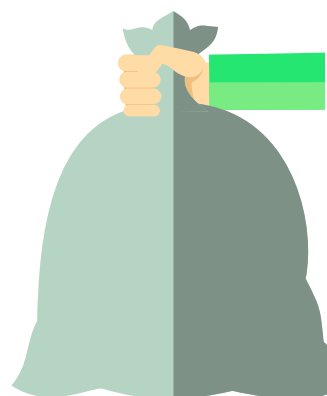


Figure 25: Willingness of Karachi's scavengers to supply PET to a recovery facility

According to Figure 25, 90 percent of scavengers in Karachi that participated in the study showed a willingness to provide collected PET bottles to a recovery facility.

5.2.1.5 JUNK DEALERS

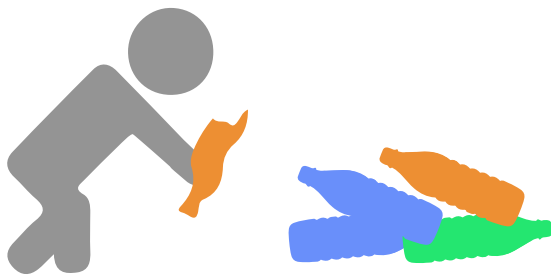
Visits to junk dealers in Karachi were carried out in February 2019. A total of 25 junk dealers from across the city were interviewed and questionnaires filled, based on the information retrieved from those interviews. Figure 26 depicts the junk dealer localities visited in Karachi.



25 junk dealers from across Karachi were interviewed



Figure 26: Localities of junk dealers in Karachi



48 %

buy PET from scavengers individually

As represented in Figure 27, after analysing the data acquired from respondents, it was found that almost 48 percent buy PET from scavengers individually, while the remaining 52 percent purchase it with mixed waste, which includes cardboard, plastic toys, glass and even metal scraps.

52 %

buy PET with mixed waste which includes cardboard, plastic toys, glass and even metal scraps.

JUNK DEALERS ON BUYING PET SEPARATELY OR WITH OTHER WASTE MATERIALS

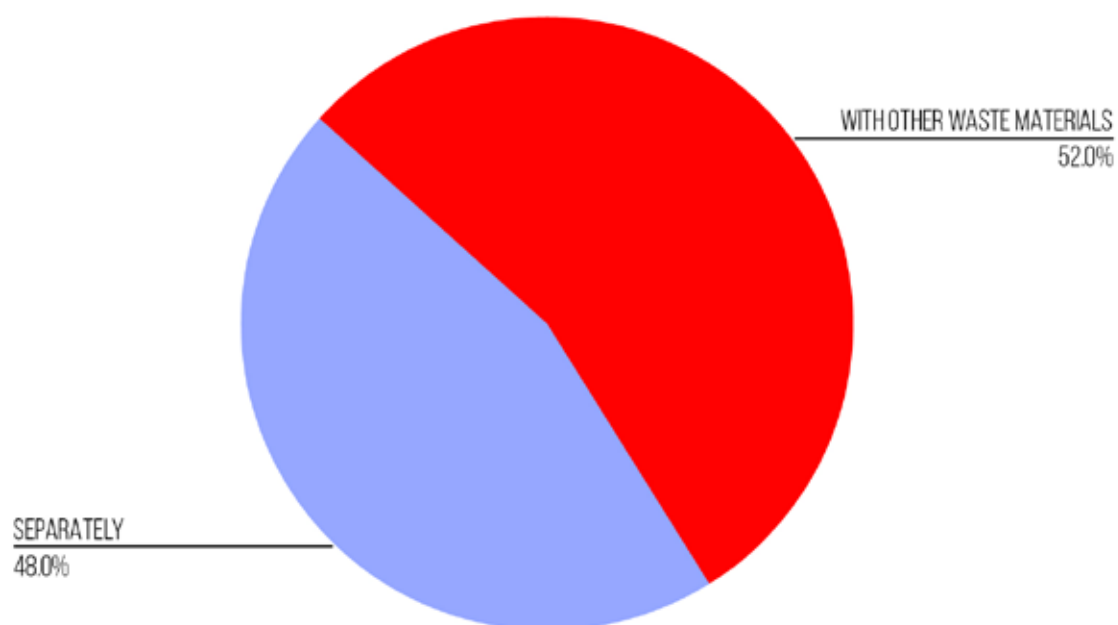


Figure 27: Perception of Karachi's junk dealers on buying PET separately or with other waste materials



Figure 28: Visit to a junk yard for PET waste in Karachi

Junk dealers interviewed stated that most of them purchased PET with other waste materials because it was cheaper to buy and scavengers generally did not separate the PET from other sellable items. However, there were some junk dealers who bought all waste, including PET, separately because of their differences in type, weight and subsequently, prices.

5.2.1.6 RECYCLERS

There are numerous PET recyclers in Karachi. However, they are mostly unregistered, which is why only three recyclers were willing to set a time for interviews. Their locations have been marked in the map in Figure 29.



Figure 29: Localities of recyclers in Karachi



Figure 30: Plastic vials being made out of recycled PET

On average, a recycler in Karachi can crush about 50 tonnes to 200 tonnes of PET per month, depending on the size of the crushing units. About two out of the three recyclers sold their PET to the textile industry, while one also sold it to the pharmaceutical industry that manufactured vials and syringes out of the crushed PET, as depicted in Figure 30.

Upon asking, all recyclers seemed to be aware of the environmental hazards that plastics cause on land and in the oceans. They were also aware of the illegal products created out of recycled plastics. Hence, two out of three recyclers were willing to manufacture new and safe products out of recycled PET if provided with a steady supply, proper equipment and manpower.

5.2.2 FAISALABAD

Visits to Faisalabad were carried out in the month of April 2019 and almost 900 individuals from households, the commercial sector and the PET supply chain were interviewed.



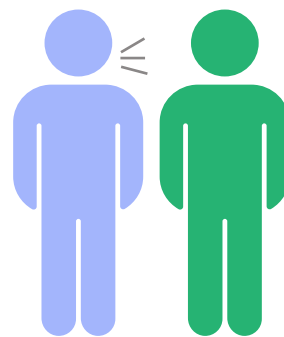
5.2.2.1 WASTE MANAGEMENT COMPANY

Faisalabad Waste Management Company (FWMC) was visited on 8 April 2019 to be debriefed about the project and for survey facilitation in order to contact scavengers, junk dealers and recyclers.

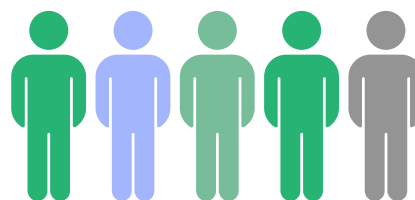
The questionnaire for waste management companies (WMCs) was also filled out by the management team.

According to respondents of the waste management sector, the main reason that prevents waste management companies from segregating waste is financial constraints. Furthermore, multiple public and private waste management companies are operating in the city, which means there are numerous dumping sites present in Faisalabad that do not come under the jurisdiction of FWMC. The company itself only has three dumping areas where waste is openly discarded.

Two out of three recyclers were willing to manufacture new and safe products out of recycled PET if provided with a steady supply, proper equipment and manpower.



900 people were interviewed



5.2.2.2 HOUSEHOLDS

Household questionnaires were filled by 830 residents of Faisalabad.

Through these questionnaires, current waste disposal practices of citizens, their awareness about plastic pollution and willingness to segregate used PET bottles for recycling was gauged.

The map in Figure 31 represents all the areas where questionnaires were conducted.

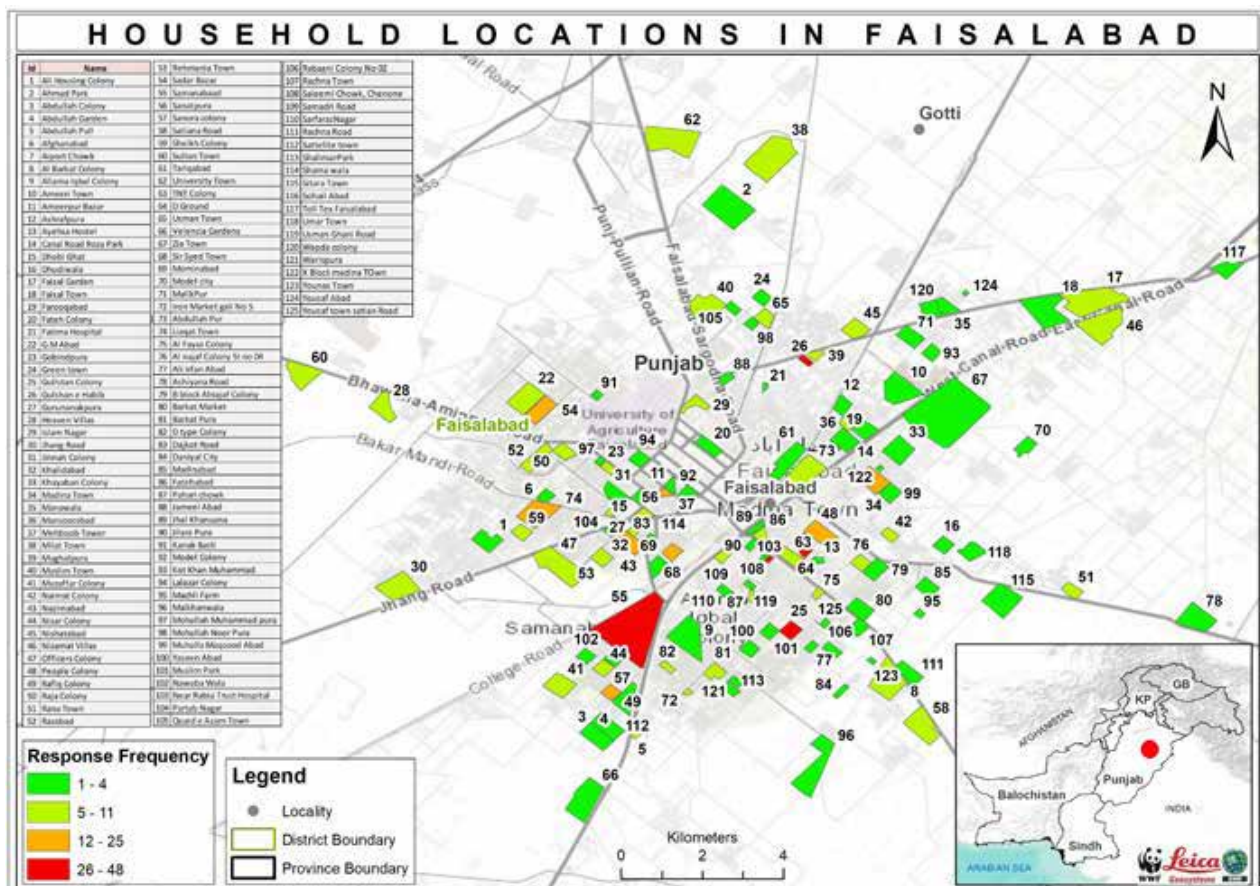


Figure 31: Household locations in Faisalabad

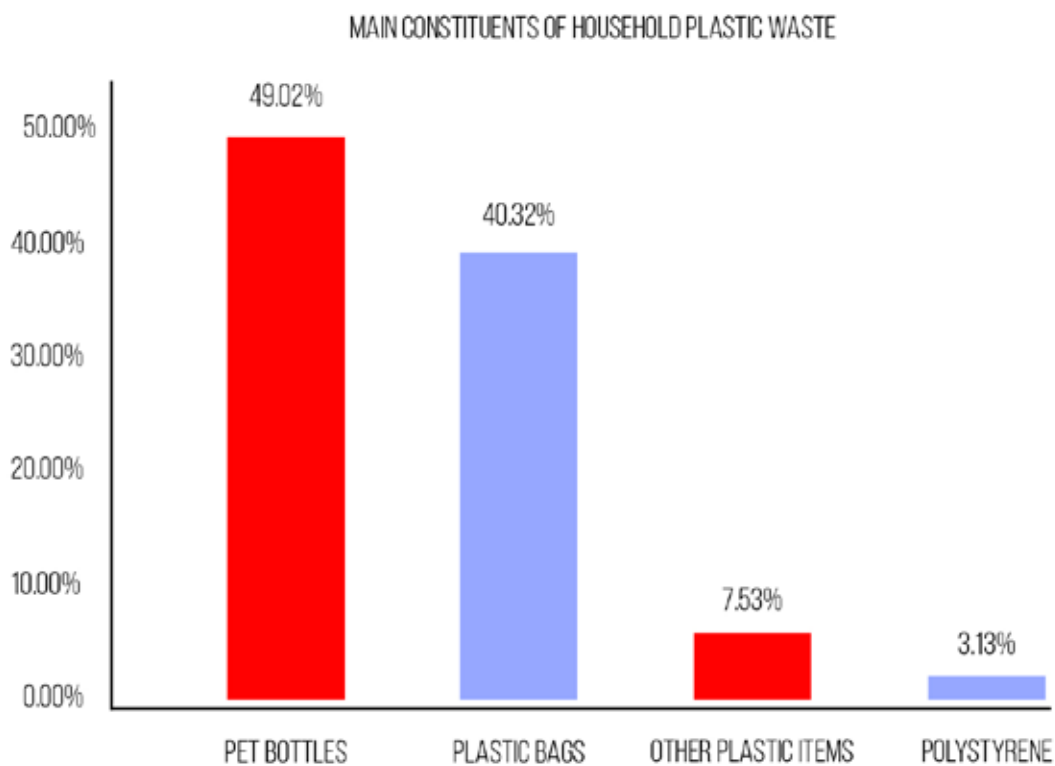


Figure 32: Main constituents of household plastic waste in Faisalabad

According to Figure 32, PET bottles are most copiously used in Faisalabad's households as over 49 percent of respondents stated that PET bottles were the main component of household plastic waste.



49 % of respondents said PET bottles are the main component of household plastic waste.

This was followed by plastic bags, which represented over 40 percent of households plastic waste.



40 % of respondents stated PET bottles are the main component of household plastic waste.

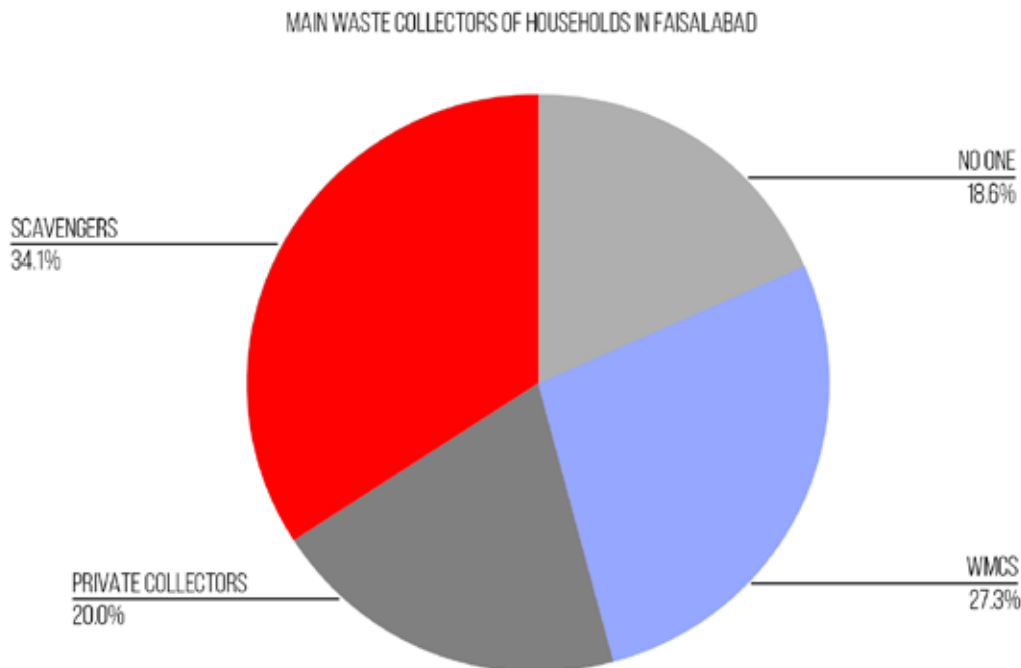


Figure 33: Main waste collectors of households in Faisalabad

According to Figure 33, scavengers are the most common waste collectors among households that were interviewed, whereas almost 27 percent of households claim that their waste is picked up by WMCS.

27 %

households claim their waste is picked up by WMCS.

Figure 34 represents that 76 percent of households were willing to provide PET bottles to a plastic recovery facility, while 24 percent who were unwilling were either already selling their PET to junk dealers, or simply not aware of the issue of plastic pollution.

76 %

were willing to provide PET bottles to a plastic recovery facility.

WILLINGNESS OF CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY

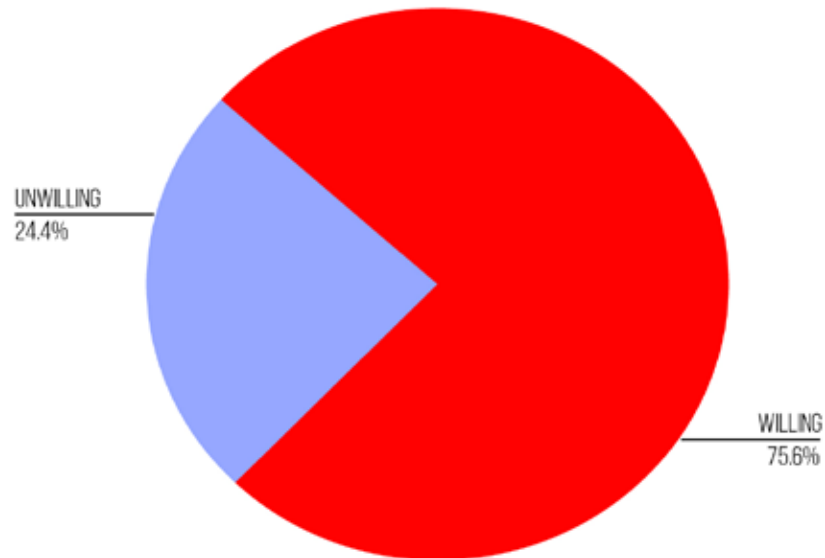


Figure 34: Willingness of Faisalabad's citizens to provide PET to a recovery facility

5.2.2.3 COMMERCIAL SECTOR

Four hotels, six restaurants and three institutions were visited in Faisalabad from 13 to 15 May 2019 in order to gather information on current

PET usage patterns in selected commercial locations, to gauge awareness levels on plastic pollution and to identify willingness to provide PET bottles to a recovery facility. The selected sites are represented on the map in Figure 35.



4 HOTELS



6 RESTAURANTS



3 INSTITUTIONS

About 50 percent of respondents in the commercial sector claimed that they sold their waste. They let their janitorial staff pick out all sellable items from their waste and sell it to scrap dealers. According to them, this practice not only encouraged segregation at source, but also provided janitorial staff a means to earn extra money.

It was calculated that out of all the commercial sectors interviewed, institutions had the highest usage of PET bottles, i.e. 346 kg. This is likely because the selected universities of Faisalabad have very high student intake, and hence, an ample number of cafeterias on one premises.

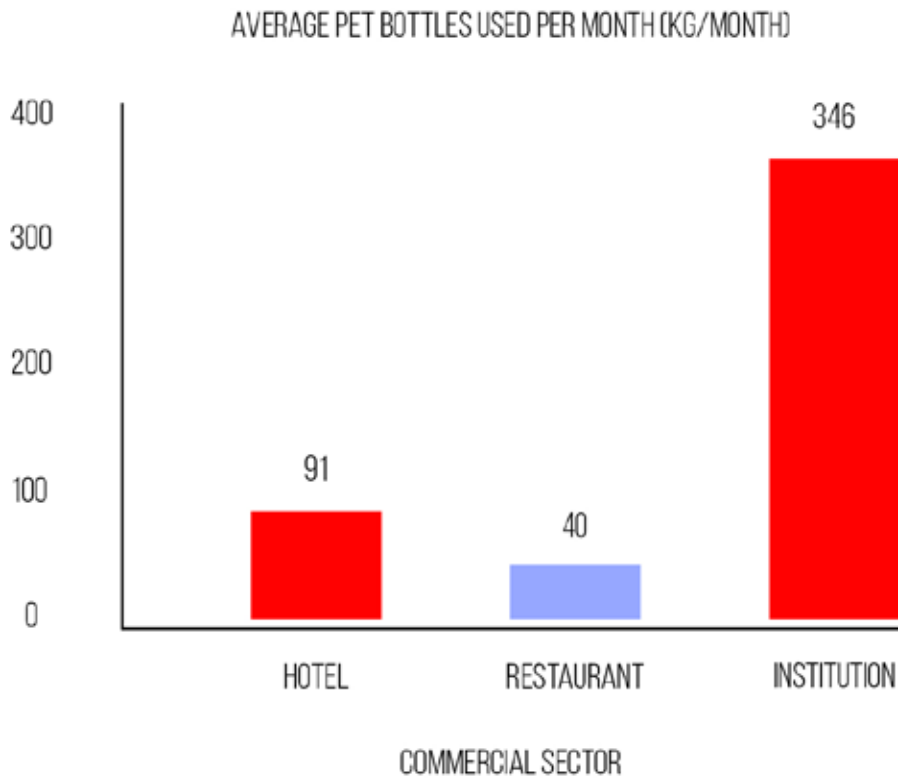


Figure 37: Monthly average PET waste generation by each commercial sector of Faisalabad

5.2.2.4 SCAVENGERS

Twelve scavengers were visited and interviewed in Faisalabad in May 2019, with the help and facilitation provided by FWMC. Most scavengers interviewed were found in open dumpsites allocated by FWMC and on roadsides. Their locations can be found in Figure 38.

Close to 70 percent of scavengers interviewed collected PET bottles from households, while the remaining 30 percent collected them from open dumps.



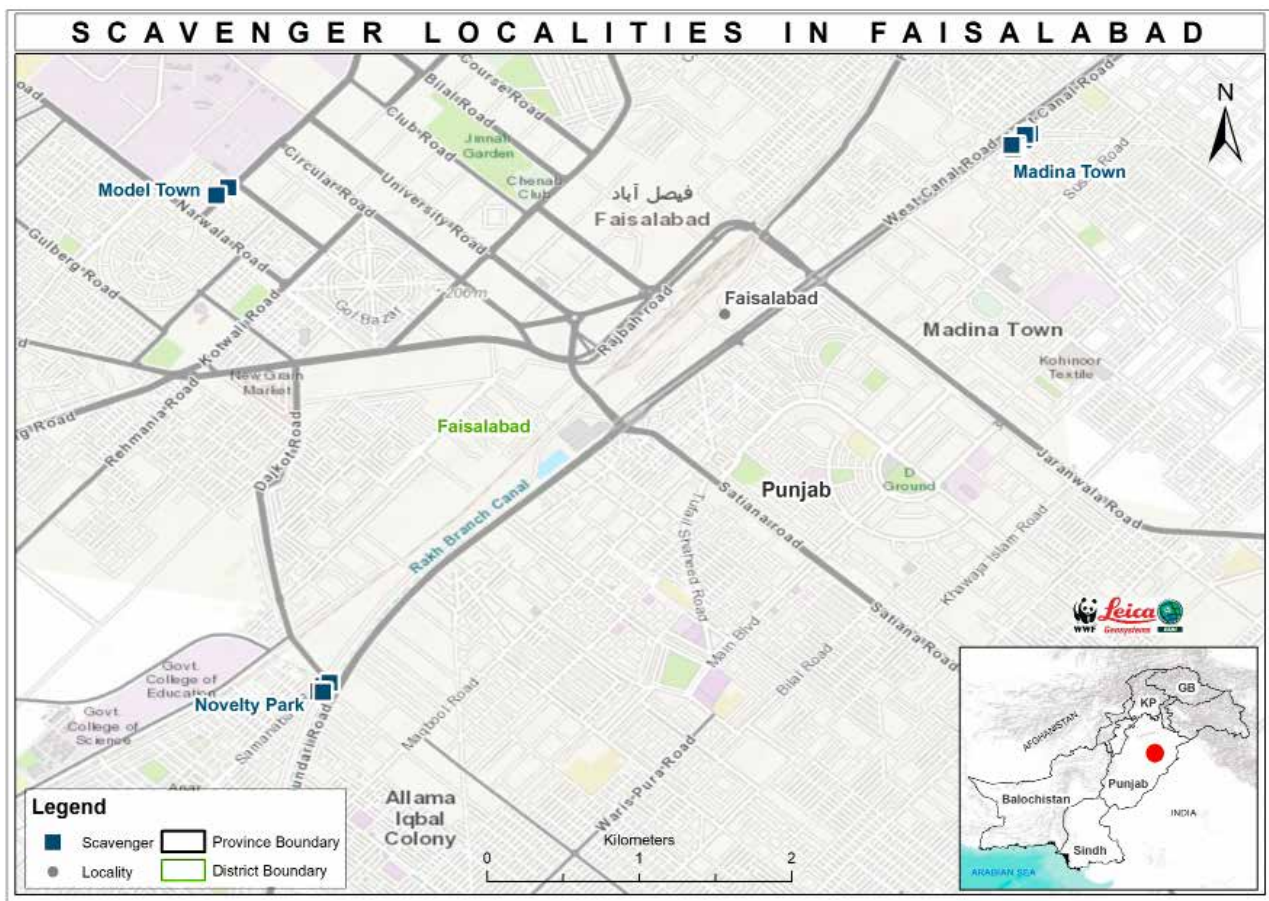


Figure 38: Scavenger localities in Faisalabad

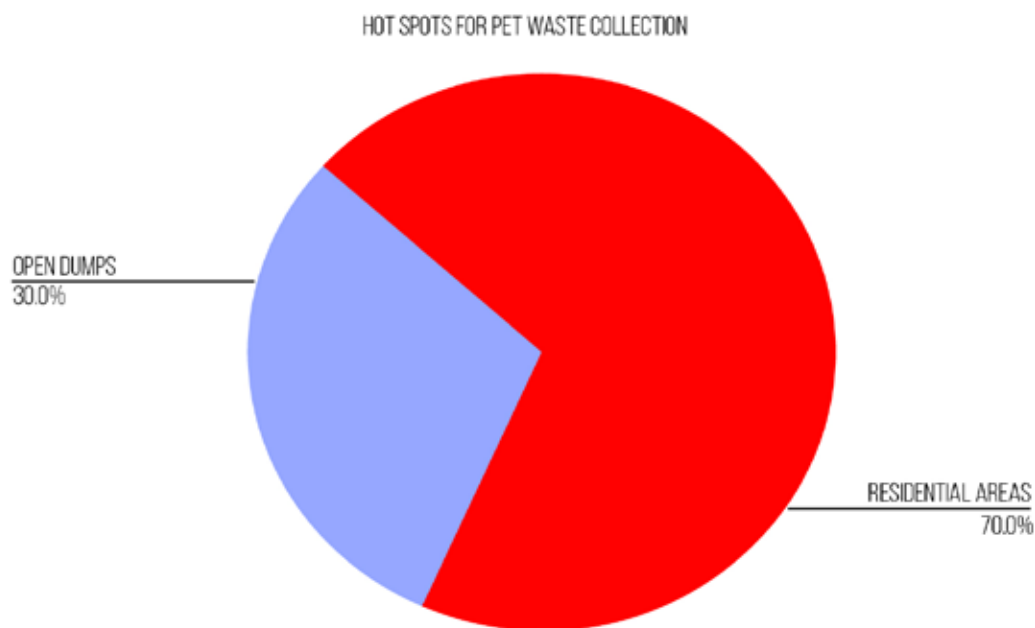


Figure 39: Common areas where scavengers collect PET in Faisalabad

Figure 39 represents that residential areas are the most common areas where 70 percent of PET bottles are collected by scavengers while 30 percent are picked up from open dumps.

76 % of scavengers interviewed were willing to provide PET to a plastic facility. (Figure 40)

WILLINGNESS OF SCAVENGERS TO PROVIDE PET TO A RECOVERY FACILITY

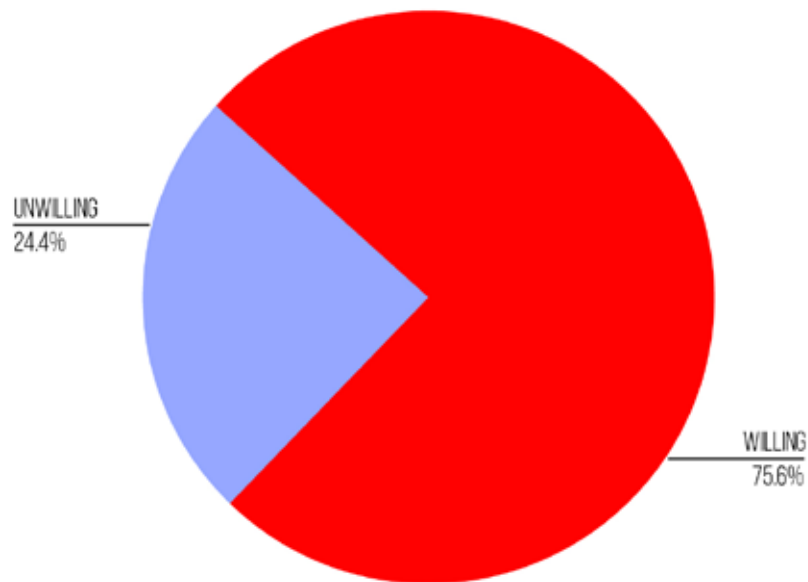


Figure 40: Willingness of scavengers based in Faisalabad to provide empty PET bottles to a plastic recovery facility

5.2.2.5 JUNK DEALERS

Nine junk dealers were visited in Faisalabad in May 2019.

Areas were identified based on responses from scavengers and through facilitation provided by FWMC. Their locations are marked on the map in Figure 41.





Figure 41: Junk dealer localities in Faisalabad

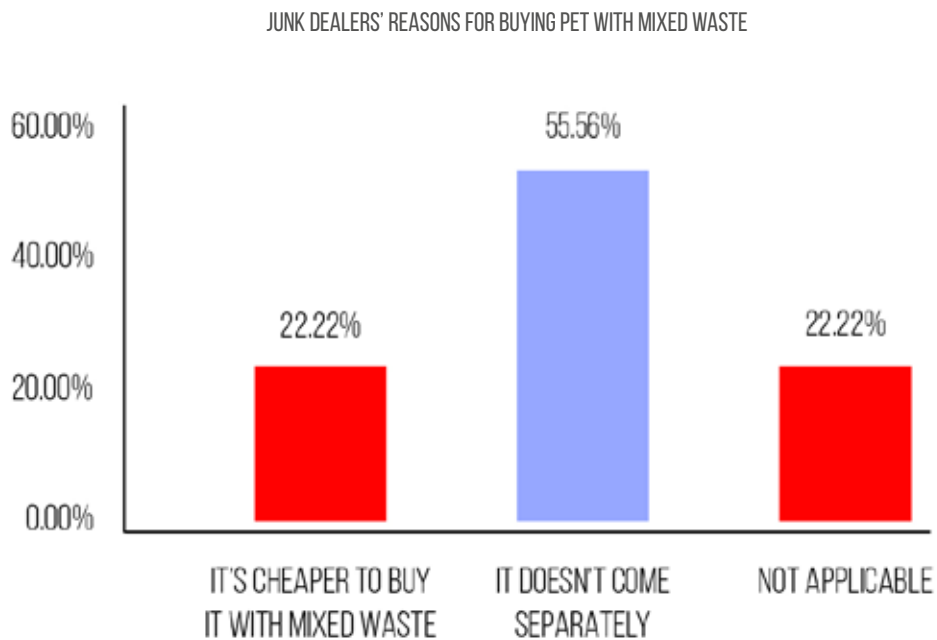


Figure 42: Junk dealers' reasons for buying PET with mixed waste

According to Figure 42, the majority of junk dealers purchase PET with other items that can be sold only because scavengers provided all such waste together (56 percent) and it is expensive to buy it separately (22 percent).

Based on their responses, junk dealers in Faisalabad can acquire an average of 200 kg of PET bottles per month and sell around 30 to 40 kg per month. Furthermore, about 50 percent of junk dealers were willing to supply their acquired PET bottles to a plastic recovery facility if they did not have to transport the bottles themselves.



5.2.2.6 RECYCLERS

Two recyclers in Faisalabad were interviewed. One was located in National Colony, while the other in Marzipura. Their locations have been marked on the map in Figure 43, while their recycling facilities are depicted in Figure 44, 45 and 46.

Each recycler in Faisalabad interviewed acquired 15 to 120 tonnes of PET waste in one month depending on the size of their crushing equipment and the quantity supplied by the PET collector. According to the two companies, the major issues were the lack of human resource and financial means to carry out the business properly.

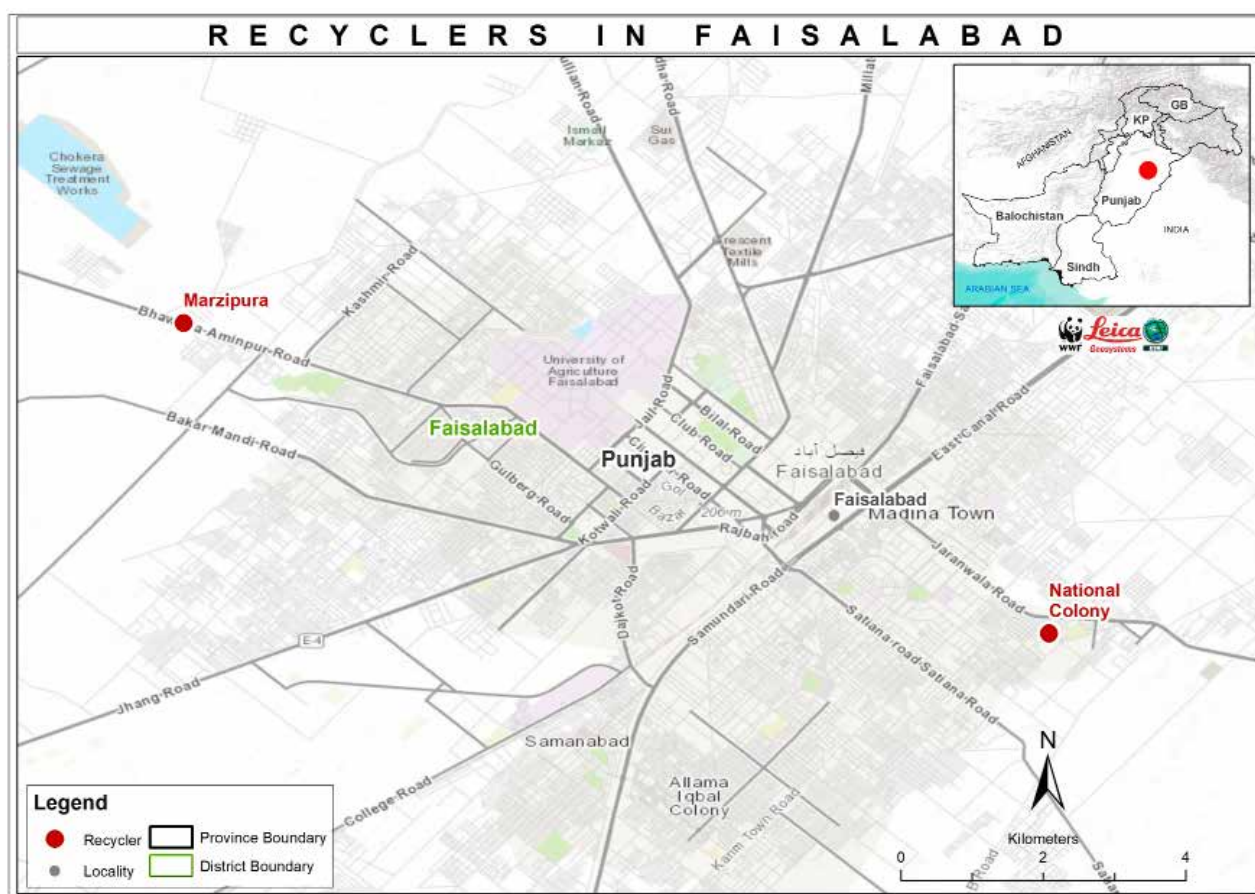


Figure 43: Recyclers' locations in Faisalabad



Figure 44: Conveyor belt at Marhaba Plastic Recycler



Figure 45: Crusher at Marhaba Plastic Recycler

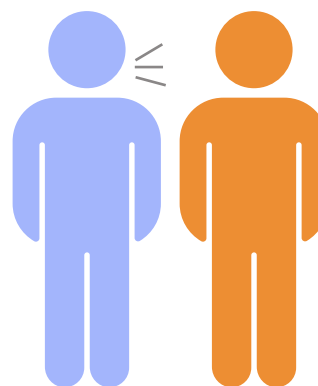
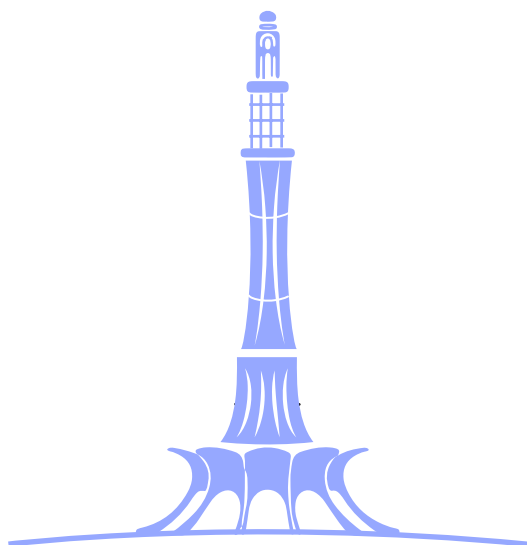


Figure 46: Plastic heaps at Faisalabad's recyclers

Furthermore, recyclers were not willing to create innovative products out of PET even if proper equipment was provided. According to them, they prefer to crush the PET and send it to recycling facilities in Lahore and Sheikhupura that later create resin and export it to China. Sending crushed PET to recycling facilities outside the city cost the recyclers about PKR 1,500 per tonne. One of the two recyclers also lacked knowledge and awareness of plastic pollution. According to the recycler, plastic was not a menace; rather due to its high demand in the market, it is a highly profitable investment for him.

5.2.3 LAHORE

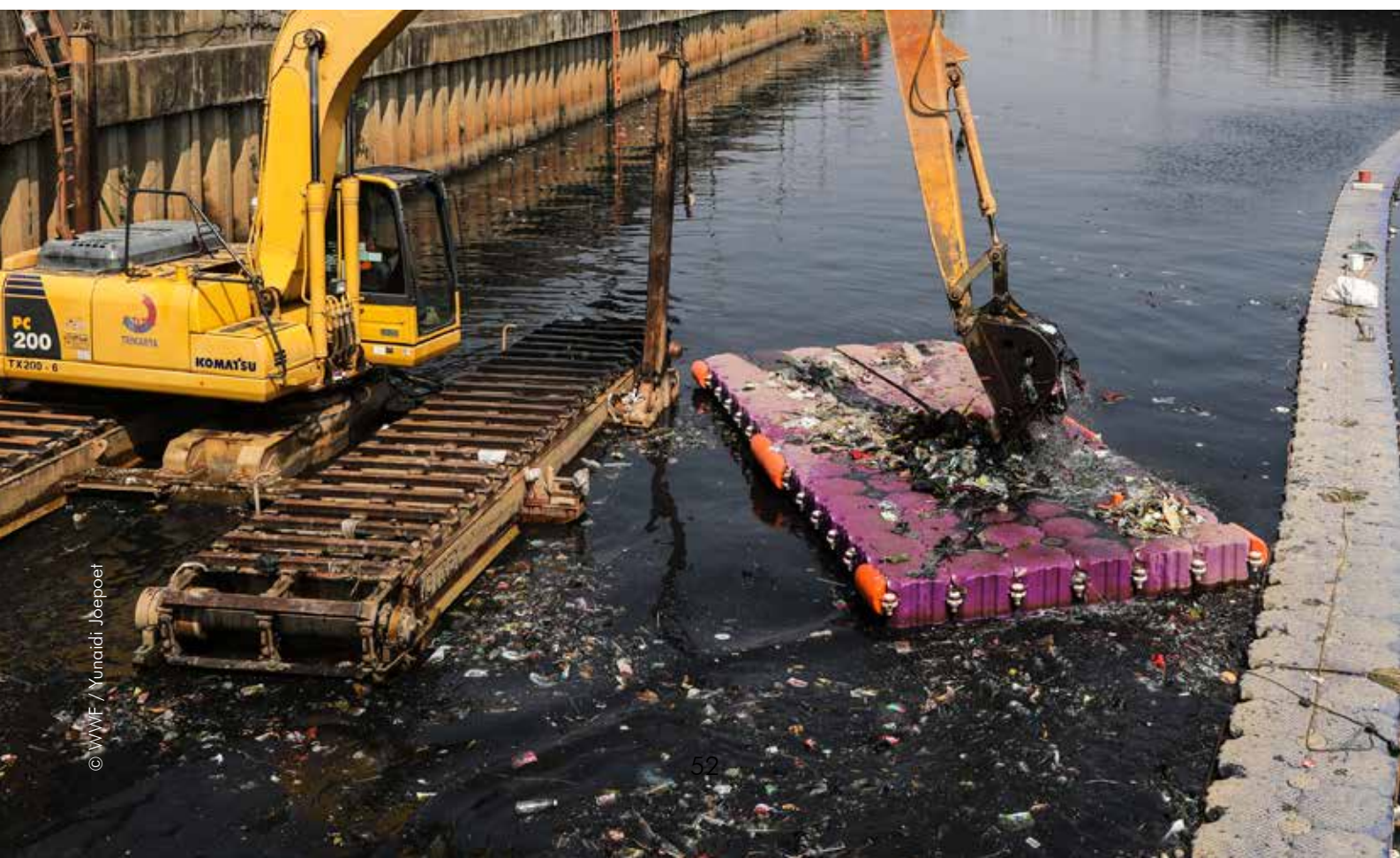
Visits to Lahore were carried out in February 2019, and almost 1,200 respondents from households, the commercial sector and PET supply chain were interviewed.



1,200 people interviewed in Lahore

5.2.3.1 WASTE MANAGEMENT COMPANIES

Visits to waste management companies in Lahore were held in the month of February 2019. These companies included Lahore Waste Management Company (LWMC), Ozpak and Waste Busters. Their locations are marked in Figure 47.



WASTE MANAGEMENT COMPANIES IN LAHORE

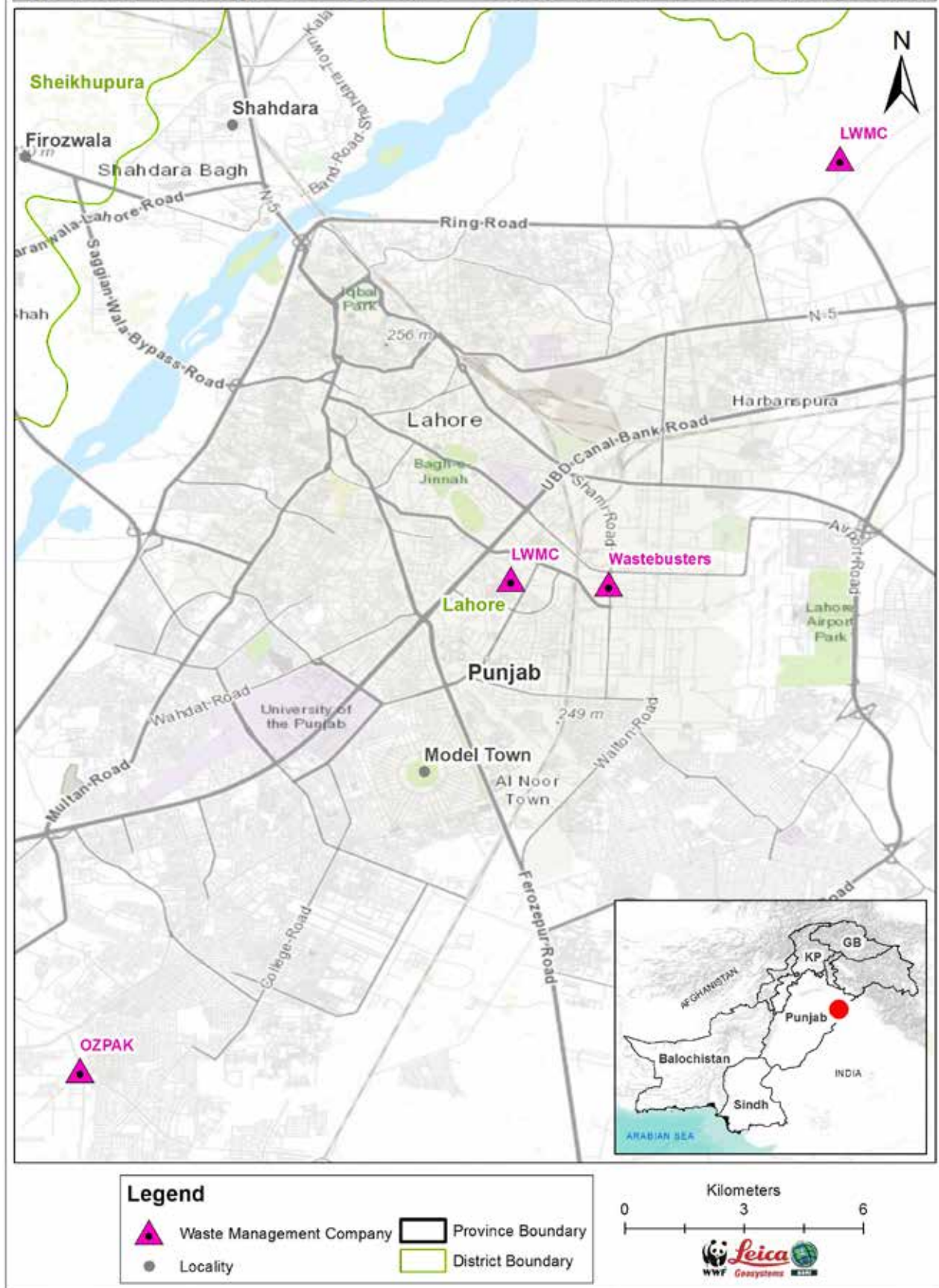


Figure 47: Locations of waste management companies in Lahore

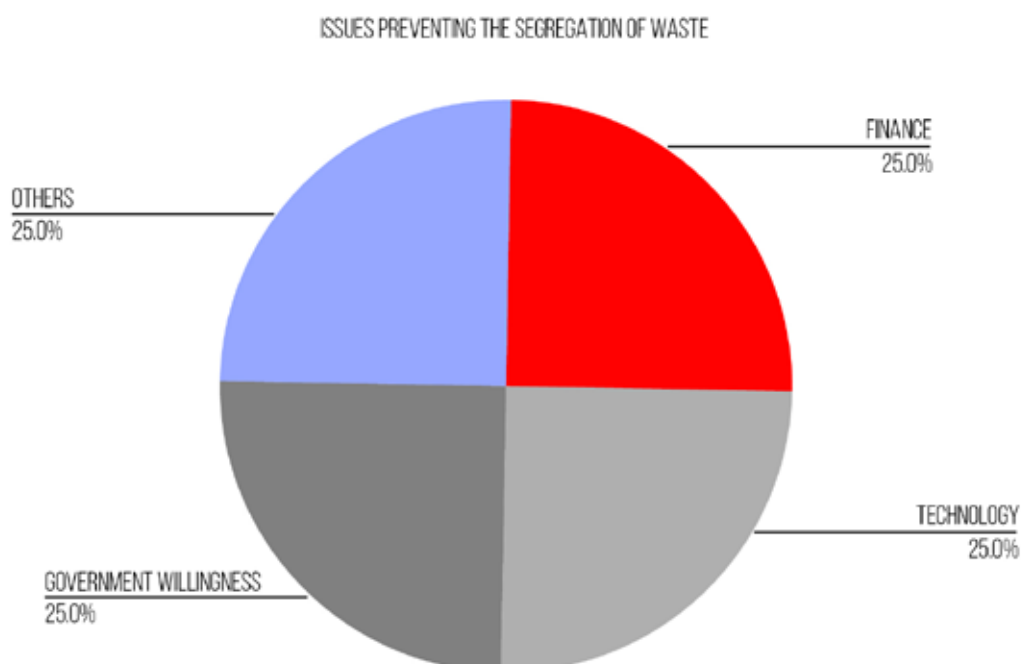


Figure 48: Issues hindering segregation of waste in Lahore's waste management companies

Figure 48 represents the major issues that hinder waste segregation. These problems include lack of financing and technology as well as the government's unwillingness to support the idea of waste segregation. Furthermore, one waste management company also stated that the absence of cooperation and support from citizens was one of the biggest reasons that prevented proper waste segregation.

Despite the fact that waste segregation was not carried out by WMCs, 75 percent claimed that less than one percent PET ended up in their collected waste, as shown in Figure 49. This was because scavengers tend to scour out the majority of waste from collection bins and dumping sites of WMCs.

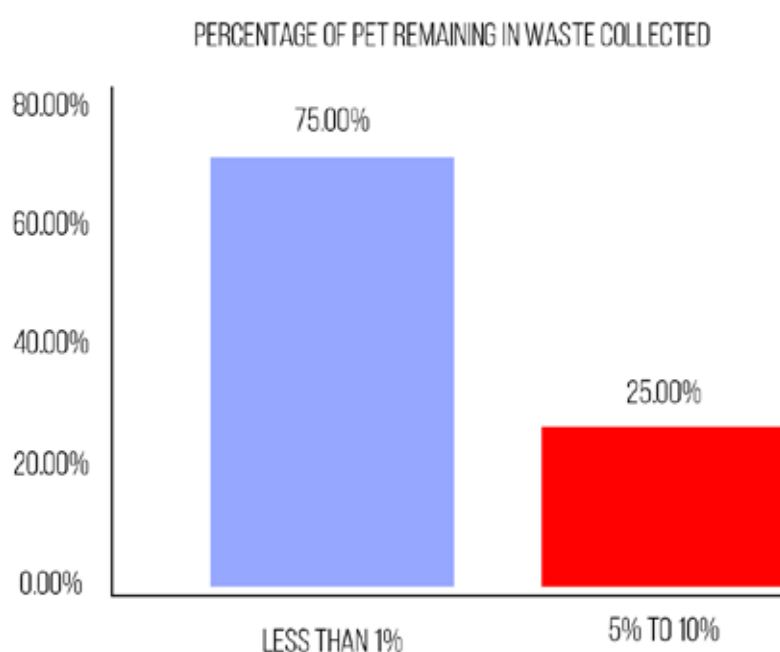


Figure 49: Percentage of PET in waste collected according to Lahore's WMCs

5.2.3.2 HOUSEHOLDS

Data of 1,100 households was collected and analyzed to assess household perception on plastic pollution and PET recycling. The locations of households are marked in Figure 50.



1,100 households interviewed.

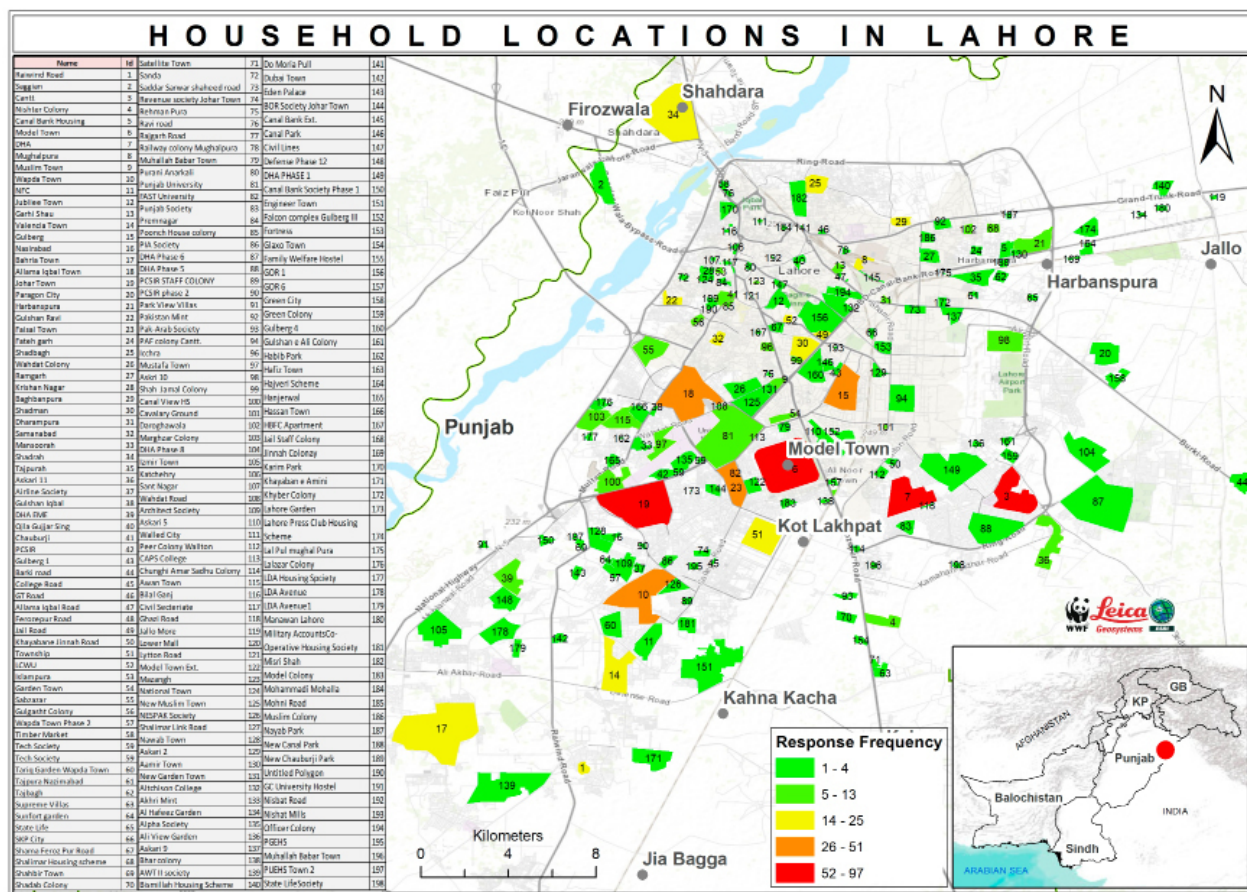


Figure 50: Household localities interviewed in Lahore

According to Figure 51, the major constituent of plastic waste among 60 percent of households was found to be plastic bags. Whereas, PET bottles were the second highest component of plastic waste for households at 29 percent. Furthermore, according to Figure 52, household waste is predominantly gathered by private collectors (55 percent), followed by WMCs (31 percent).

PET bottles were the second major component of plastic waste in 29 percent of households.



60 % of household waste included plastic bags.



29 % of household waste was made up of PET bottles.

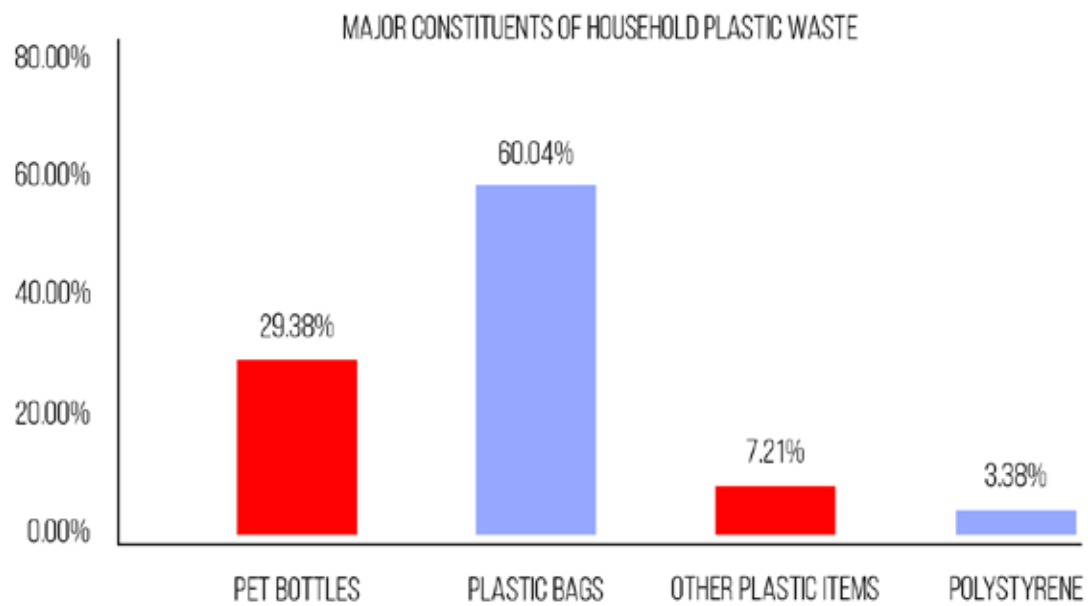


Figure 51: Major constituents of household plastic waste in Lahore

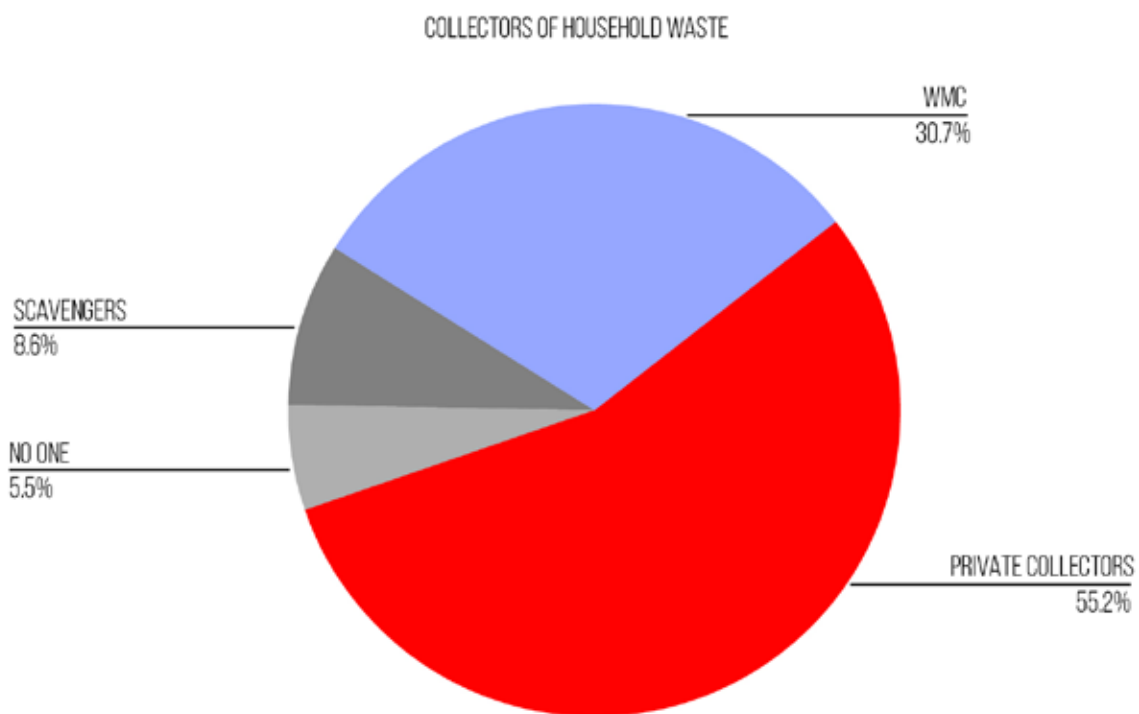


Figure 52: Household waste collectors in Lahore

When asked, almost 89 percent of citizens were willing to provide PET to a recovery facility as shown in Figure 53.



WILLINGNESS OF LAHORE'S CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY

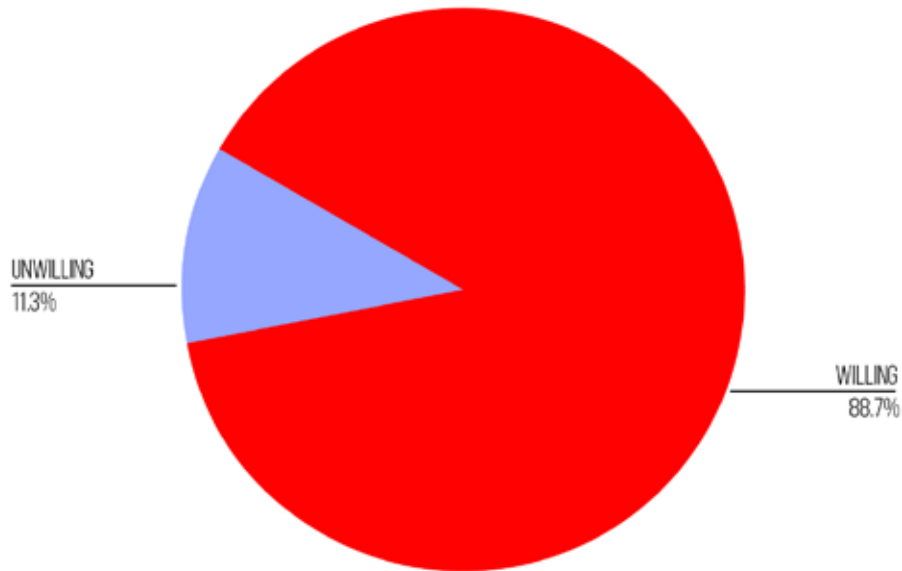


Figure 53: Willingness of Lahore's citizens to provide PET to a recovery facility

5.2.3.3 COMMERCIAL SECTOR

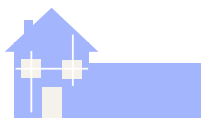
Visits to hotels, restaurants and institutions based in Lahore were conducted in February 2019; their locations have been marked on the map in Figure 54.



5 HOTELS



15 RESTAURANTS



10 INSTITUTIONS

About 94 percent of respondents interviewed did not segregate and/or sell their waste, rather it was disposed off at a selected dumpsite.



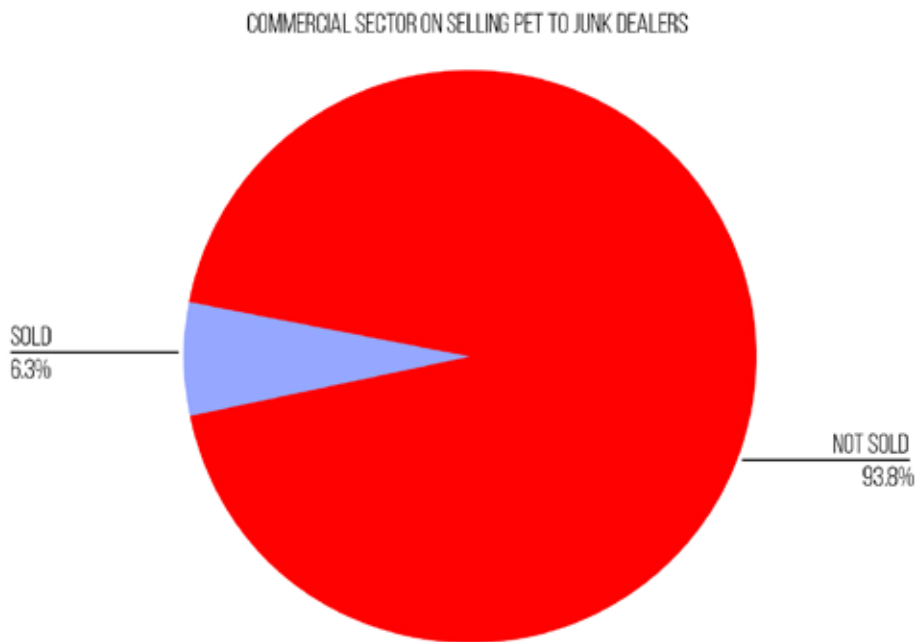


Figure 55: Lahore's commercial sector responses on selling PET waste

Figure 55 shows that about 94 percent of the commercial sector interviewed did not segregate or sell their waste to junk dealers. They disposed of it in a selected dumpsite where waste management companies gathered it and transported it to a designated dumping area in Lakhodair.

According to Figure 56, on average, hotels use 169.3 kg of PET bottles per month, while institutions use almost 96 kg of PET bottles.

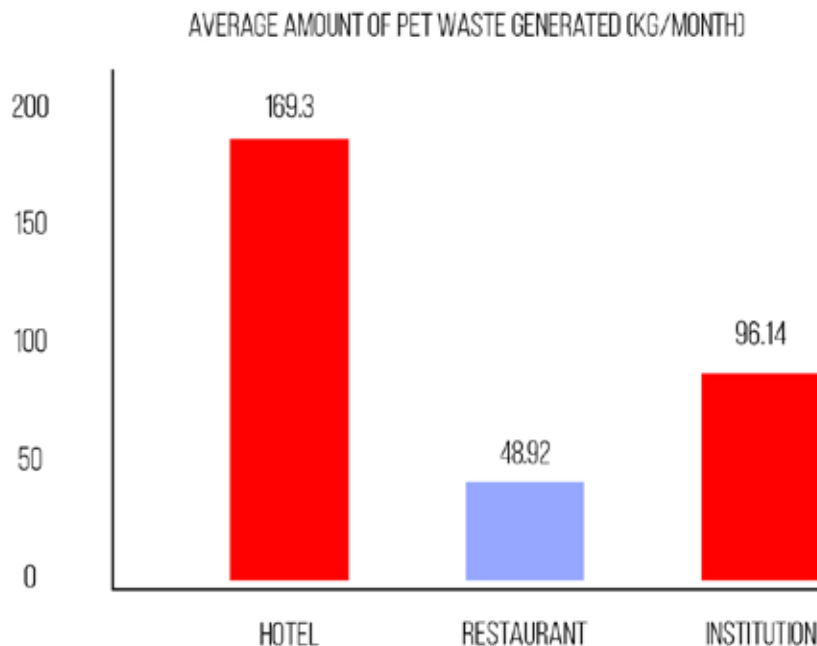


Figure 56: Average amount of PET waste generated in the commercial sector of Lahore per month

5.2.3.4 SCAVENGERS

Scavengers in Lahore are Afghan migrants who are unable to attain citizenship of Pakistan. As a result, waste picking is their only source of income as formally registered WMCs cannot hire them. The localities visited are marked in Figure 57.

Sellable items collected only help scavengers earn a nominal income of PKR 300 to PKR 500 per day.



Afghan migrants' only source of income is through waste picking.



Localities of scavengers are marked in Figure 57.



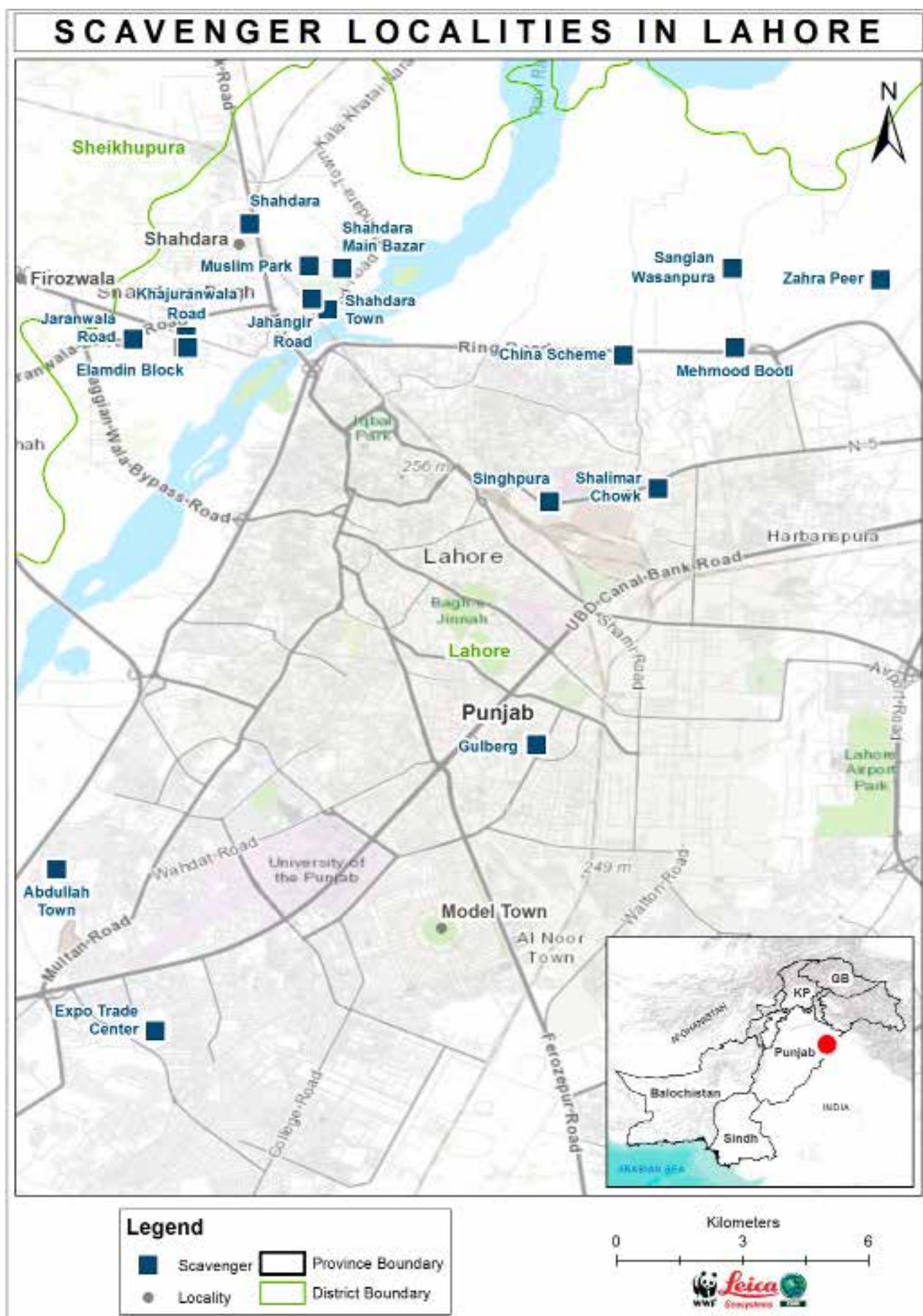


Figure 57: Scavenger localities in Lahore

Commonly, these scavengers scour through open dump sites or collection bins to gather PET bottles. Figure 58 shows the hotspots for PET collection, which depicts that 75 percent of collection is done from open dumps. Some also gather recyclables through door-to-door collection in areas where WMCs have no access. Commercial areas also prove to be PET collection hotspots for 13 percent of scavengers as they can simply segregate the waste at the source.

In Lahore, scavengers face a plethora of problems while scavenging through waste heaps in order to collect sellable items. According to Figure 59, 46 percent of scavengers interviewed claimed they face health issues such as back-aches caused by carrying heavy sacks. Close to 15 percent claimed their rejection by the job market poses huge financial burdens while 14 percent stated that they face no challenges and are satisfied with their work.

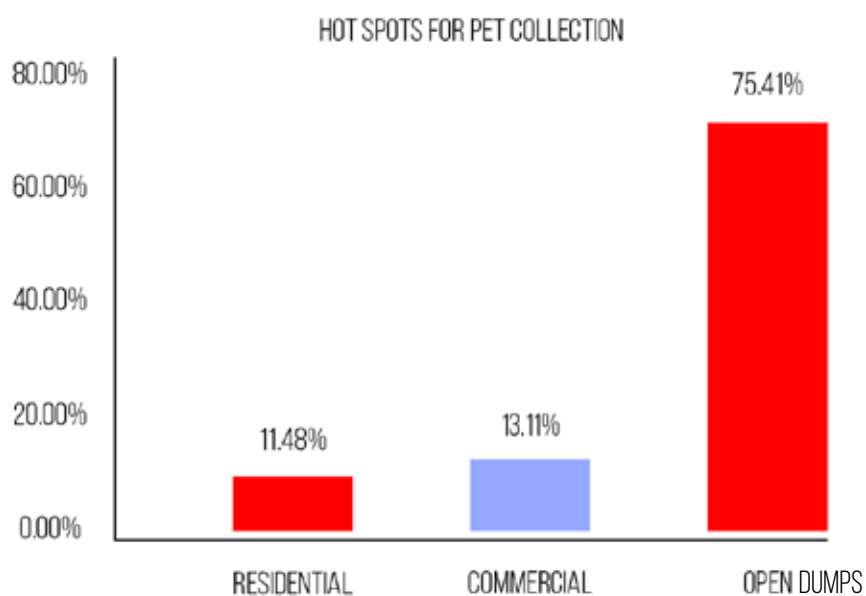


Figure 58: Hotspot areas for PET collection by scavengers in Lahore

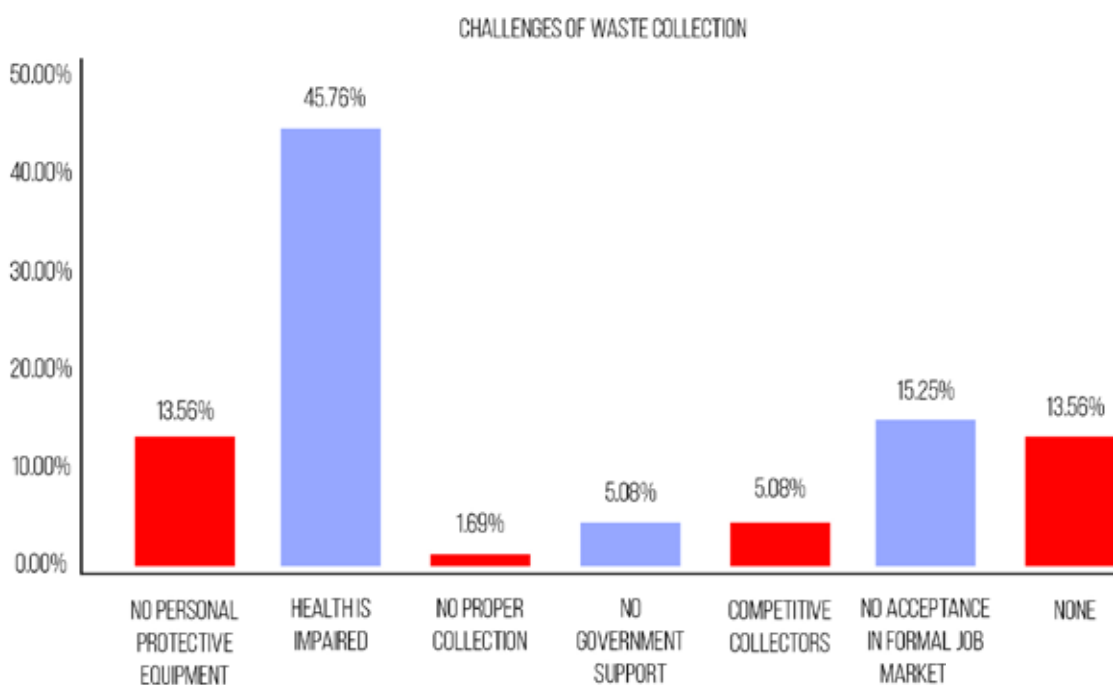


Figure 59: Challenges faced by scavengers in Lahore during PET collection

When asked, over 62 percent of Lahore's scavengers were willing to provide PET to a recovery facility, as represented in Figure 60.

62 %

scavengers in Lahore are willing to provide PET to a recovery facility.

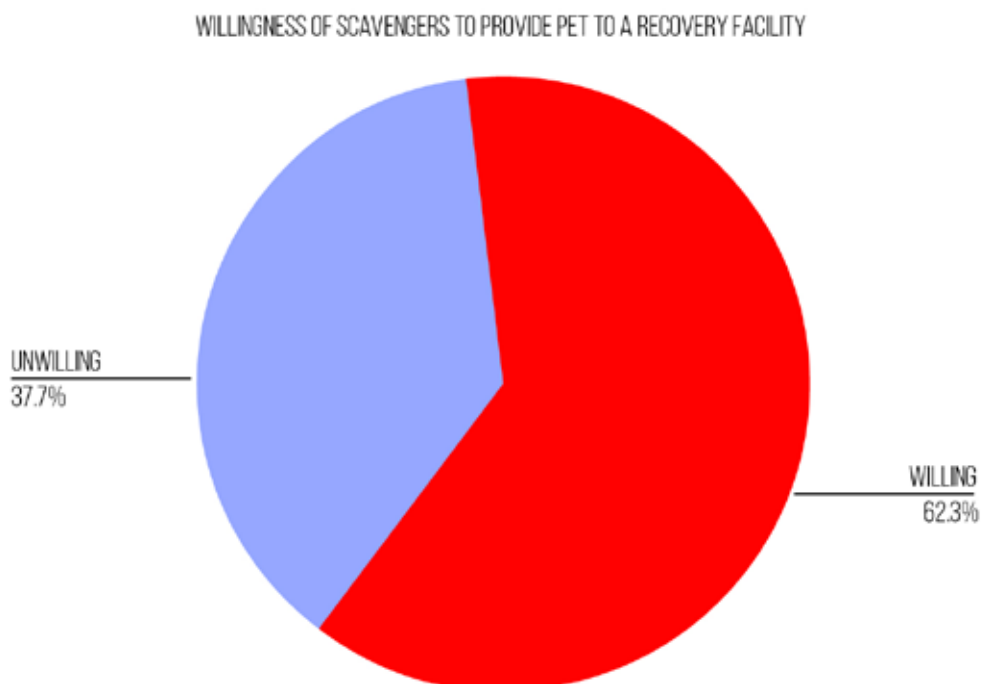
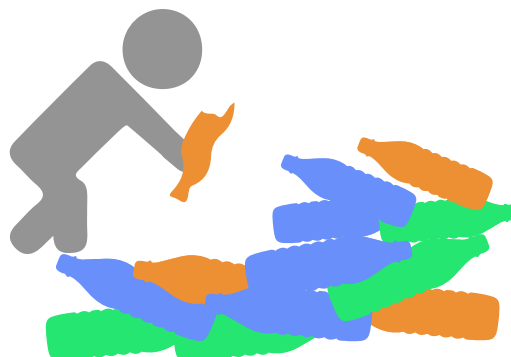


Figure 60: Willingness of Lahore's scavengers to provide PET to a recovery facility

5.2.3.5 JUNK DEALERS

Over 25 junk dealers were visited and interviewed in Lahore.

Over 25 junk dealers were visited and interviewed in Lahore. Some only acquired PET, while others purchased mixed waste from waste collectors. Their localities and shop locations are presented in Figure 61.



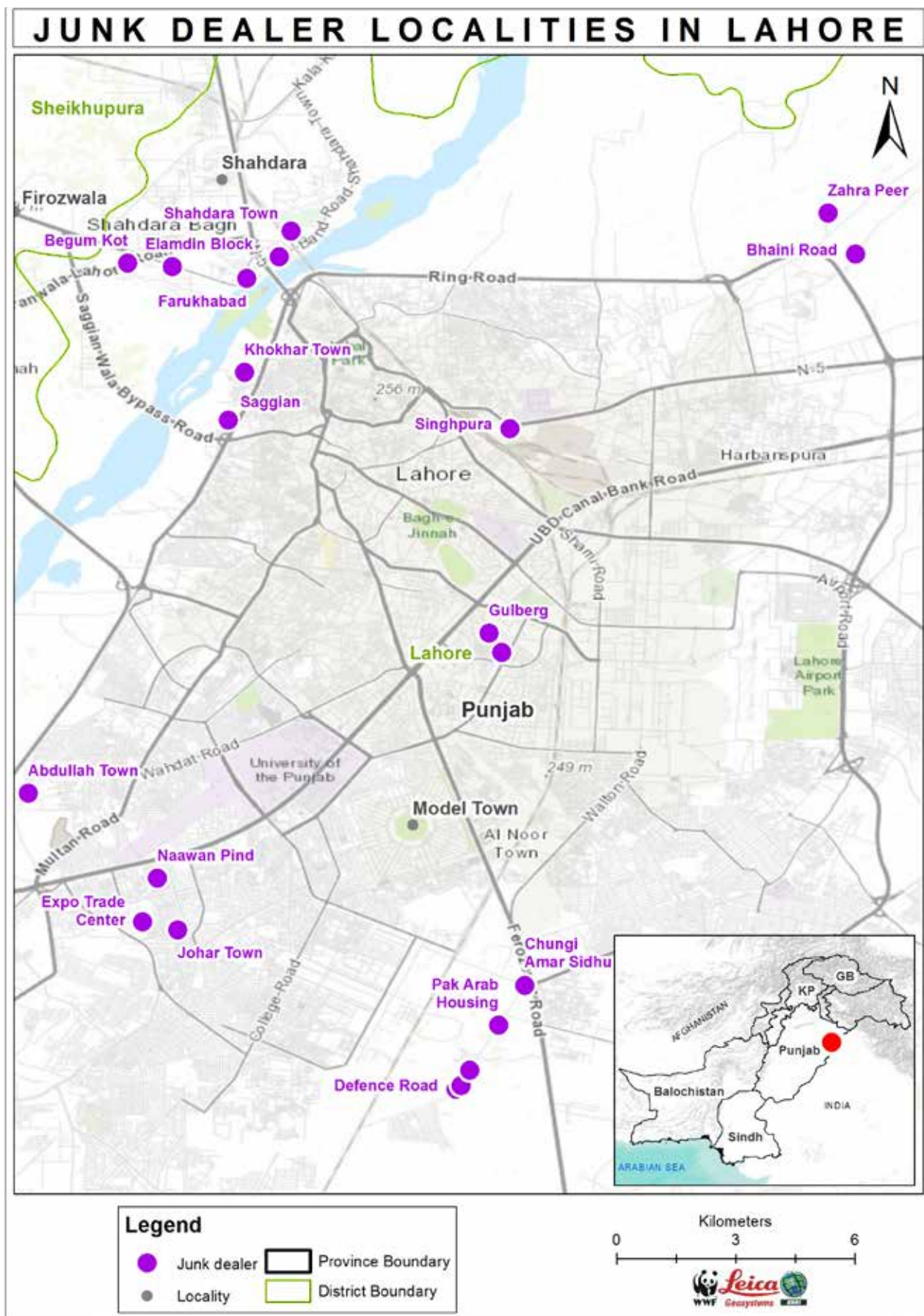


Figure 61: Junk dealer localities in Lahore

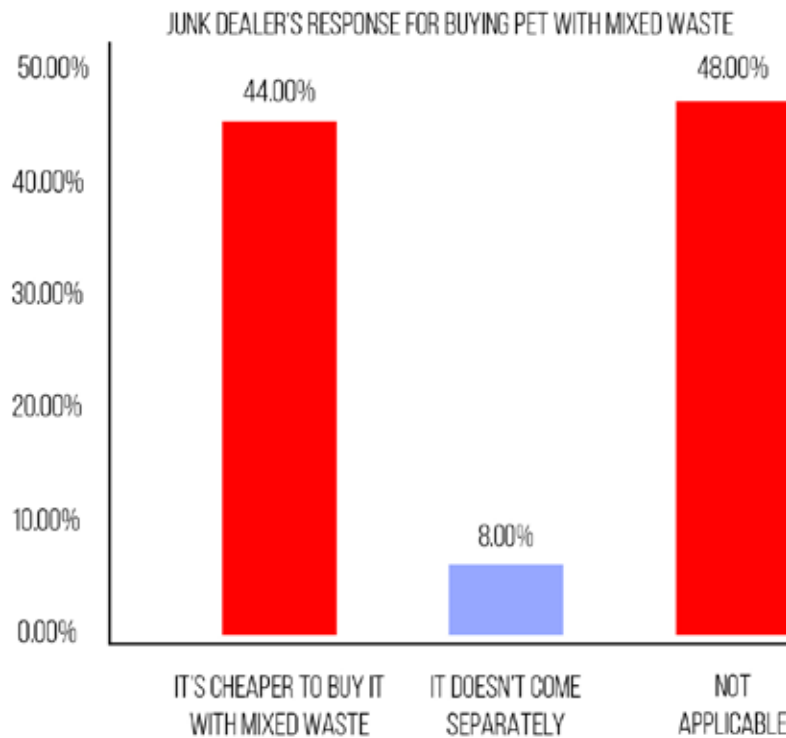


Figure 62: Reasons for junk dealers buying PET with other sellable waste

According to Figure 62, 44 percent of junk dealers prefer to buy PET with other sellable items because it is cheaper to do so. On the other hand, 48 percent prefer to buy PET separately as it is more economically beneficial for them.

According to Figure 63, about 76 percent of respondents were willing to provide PET bottles to a formal recovery facility, while the rest stated that they would prefer to follow the current supply chain of PET waste and provide it only to their designated recycler.

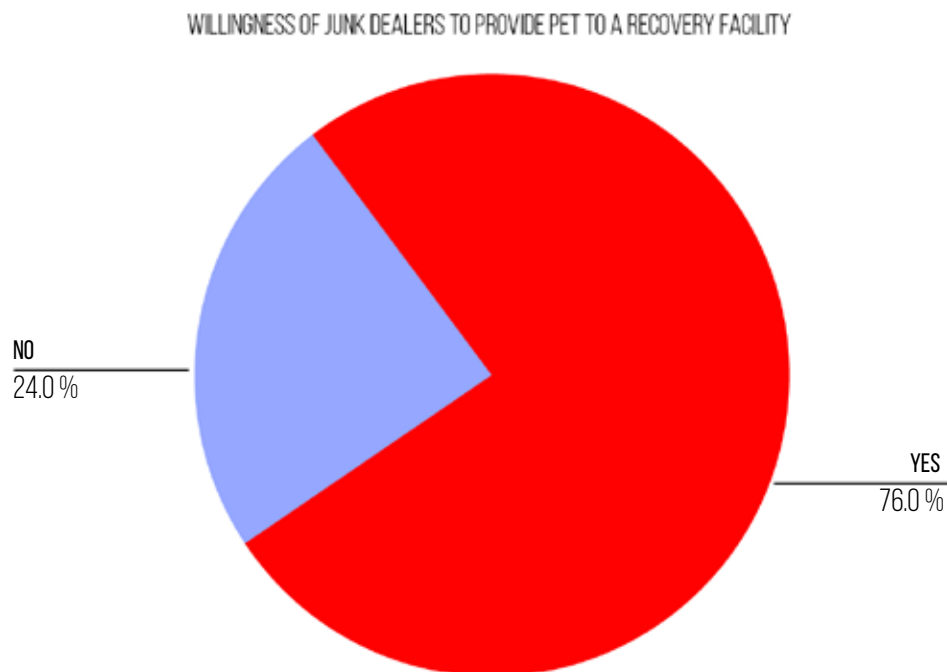
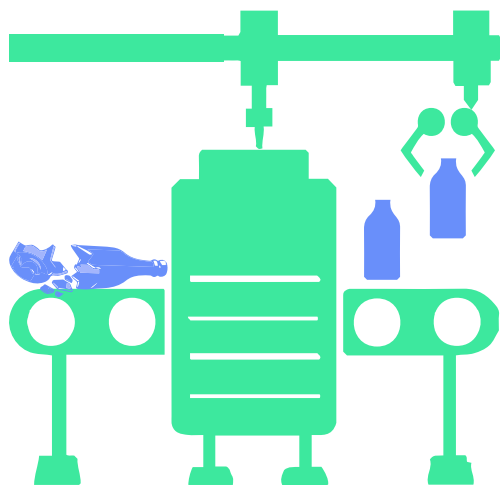


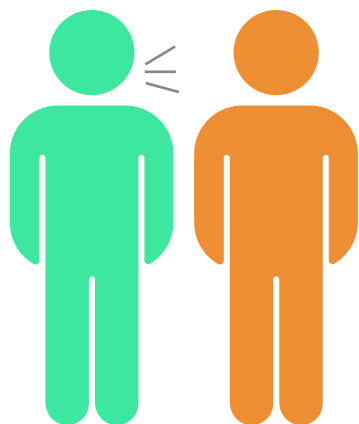
Figure 63: Willingness of junk dealers to supply PET to a recovery facility

5.2.3.6 RECYCLERS

In February 2019, recyclers were visited and interviewed in Lahore. It was found that the PET recycling industry is growing informally at a rapid rate. So much so, that instead of giving PET to recyclers, junk dealers have set up their own crushing units to create PET flakes, which are then exported to China.



Five recyclers were interviewed and their localities are marked in Figure 64. It was found that on average, a PET recycler in Lahore crushes about 280 tonnes of PET and converts it into flakes. The majority of these flakes are sold to the textile industry to be incorporated into clothing and thread.



5 recyclers were interviewed



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Upon visiting the recycling facilities in Lahore, as shown in Figure 65, 66 and 67, it was found that the majority of recyclers were unregistered and informal. Due to this, most workers were underage.



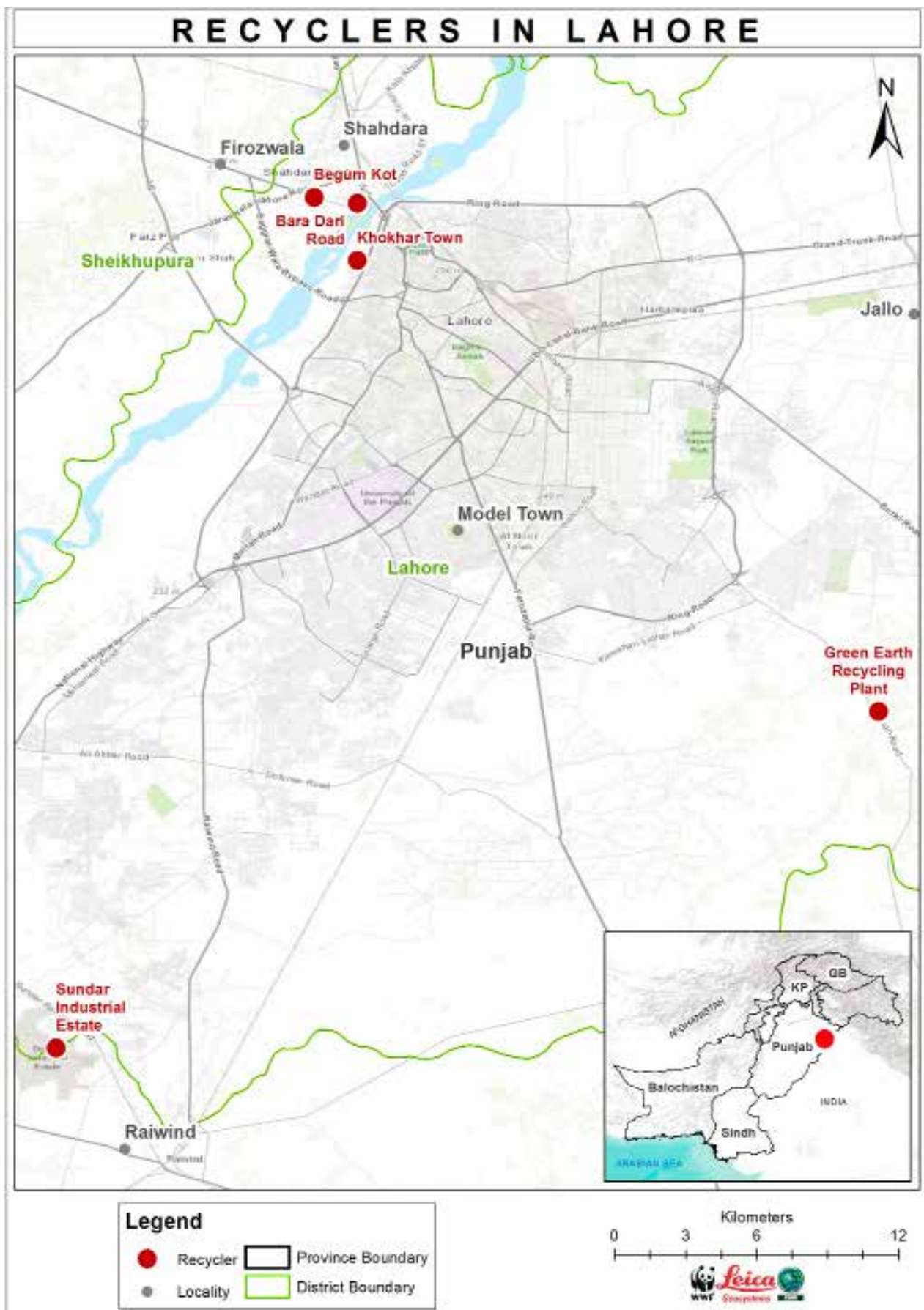


Figure 64: Localities of recyclers in Lahore



Figure 65: Recycler in China Scheme, Lahore



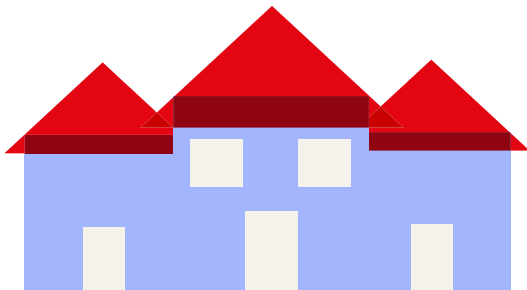
Figure 66: Crushers in Lahore



Figure 67: Sorting and cleaning of crushed PET

5.2.4 MURREE

A visit to Murree was carried out from 28 to 30 April 2019 and almost 270 respondents from households, the commercial sector and the PET supply chain were interviewed.



5.2.4.1 WASTE MANAGEMENT COMPANY

In April 2019 the WWF-Pakistan team met with the team from Albayrak Waste Management Company and Tehsil Municipal Authority (TMA) in Murree. The two companies work collaboratively to collect waste from UC-49 and have a collection efficiency of 70 percent.

According to representatives from both organizations, there is no transfer station located in Murree. Hence, all collected waste is directly transferred to Rawalpindi's dumpsite in various shifts. The lack of transfer station and finances also make it next to impossible to segregate the waste in Murree. Furthermore, the two companies rarely found any PET bottles in their collection bins, which are placed in various areas of Murree, because they are mostly segregated at source by the janitorial staff of hotels and restaurants, and remaining bottles are gathered by scavengers from collection bins.

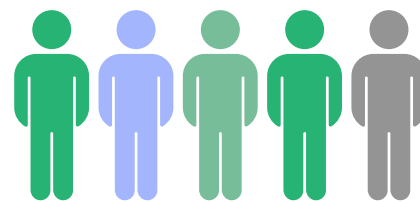
Through the team's assistance, the locations of scavengers, junk dealers and recyclers were identified to conduct interviews.

5.2.4.2 HOUSEHOLDS

Household questionnaires in Murree were filled out by students in Murree's colleges and schools as well as the hotel and restaurant staff. Their locations are marked in Figure 68.



Locations of scavengers, junk dealers and recyclers were identified.



245 respondents completed the survey.

Due to a low population density in Murree, only 245 individuals filled survey questionnaires.

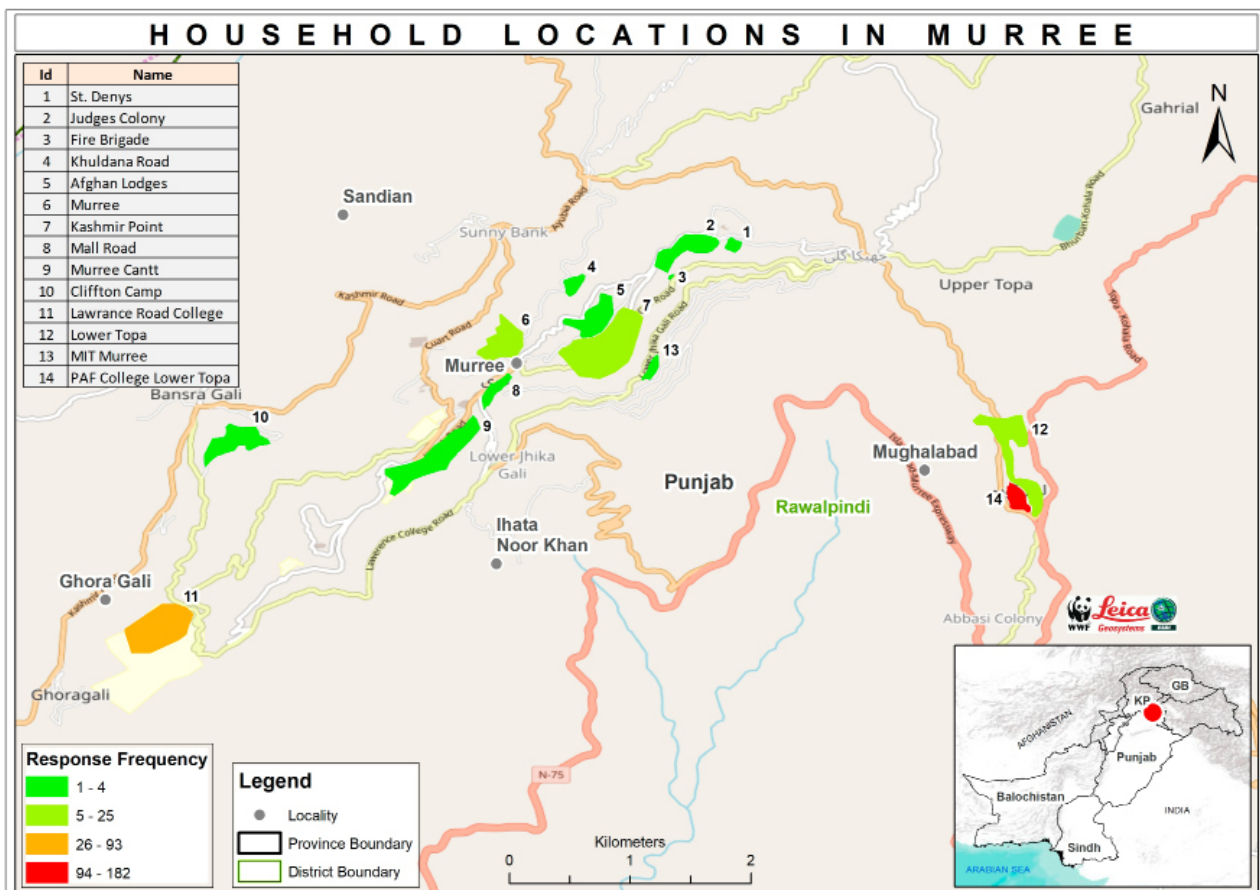


Figure 68: Localities of households interviewed in Murree

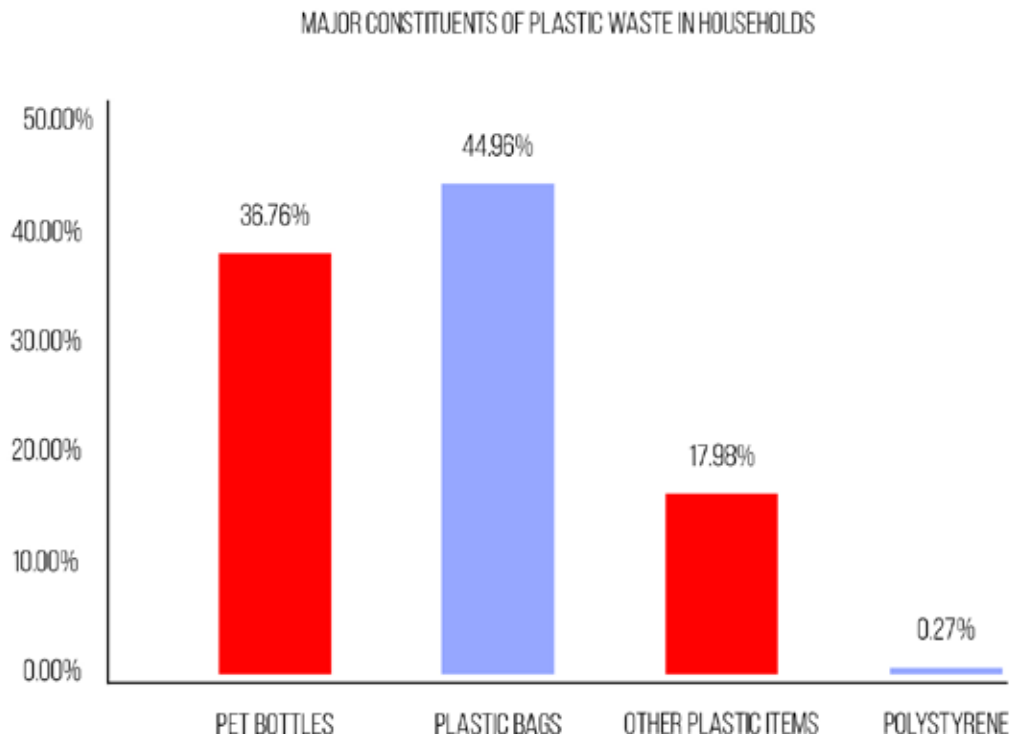


Figure 69: Major constituents of plastic waste in Murree's households

As demonstrated by Figure 69, in Murree, PET bottles constitute the second highest component of plastic waste in households. Thus, after plastic bags, PET bottles have become the most used plastic item in residential areas (37 percent).

Figure 70 represents that 43 percent of households have private waste collectors. It is likely that these private collectors are junk dealers to whom households sell their recyclables. Furthermore, only 27 percent claimed that waste is collected by either Albayrak or TMC.

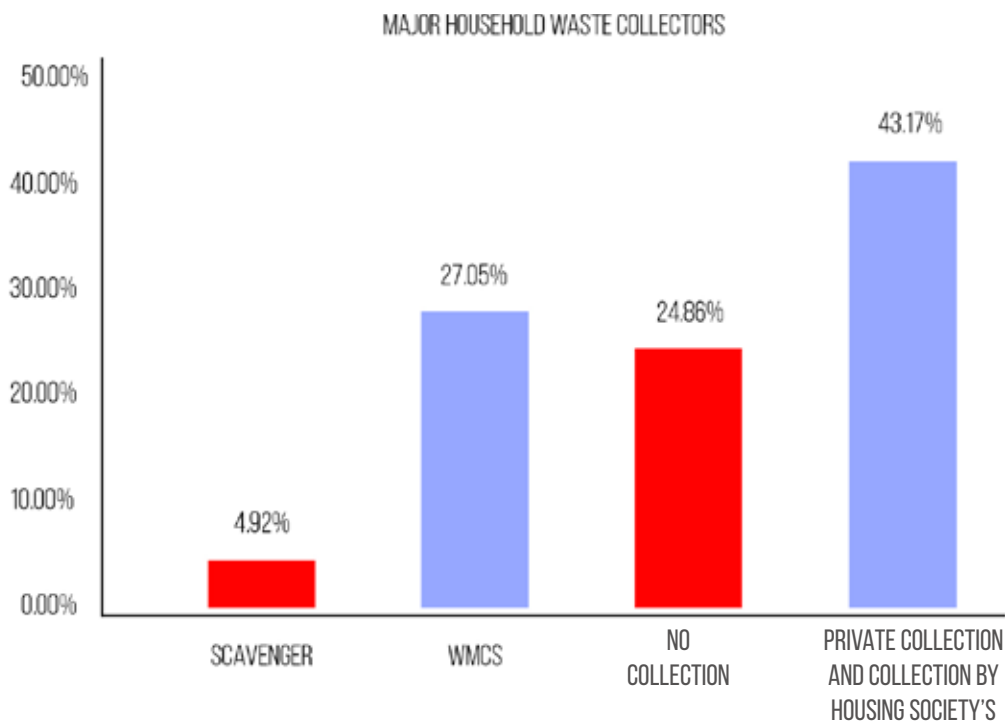


Figure 70: Major waste collectors in households in Murree

According to Figure 71, 22 percent of Murree's population currently sell their PET to junk dealers. However, upon asking, almost 93 percent of respondents were willing to segregate their waste and provide used PET bottles to a recovery facility. The results can also be seen in the pie chart in Figure 72.

93 %

citizens willing to provide PET bottles to a recovery facility.

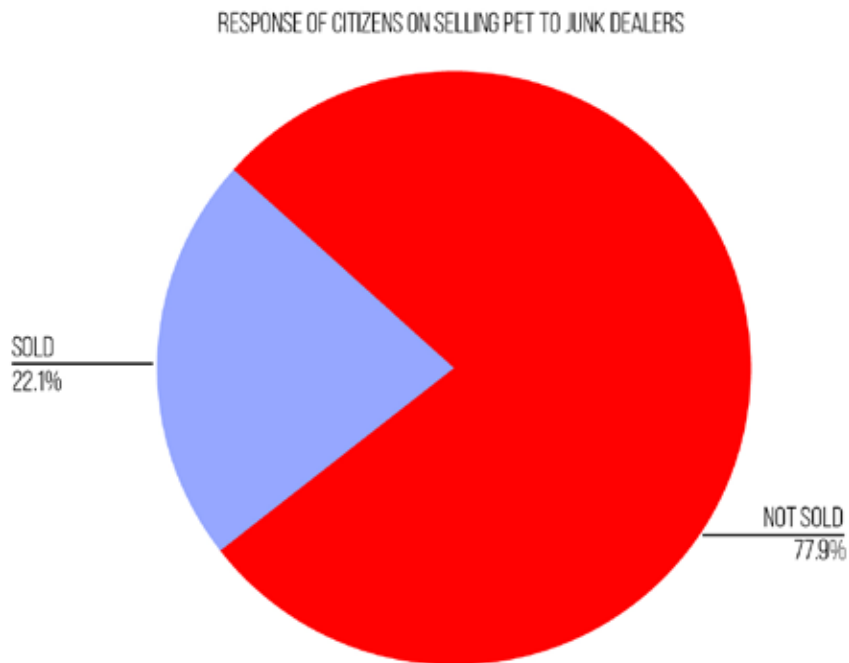


Figure 71: Response of Murree's citizens on selling PET to junk dealers

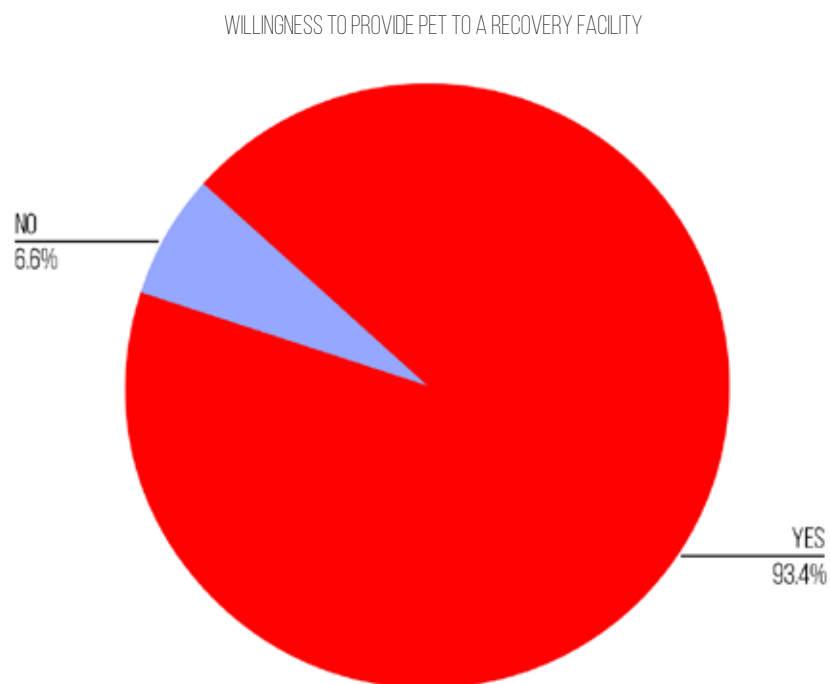


Figure 72: Willingness to provide PET to a recovery facility

5.2.4.3 COMMERCIAL SECTOR

Since Murree is a popular tourist spot, it was assumed that hotels and restaurants would have high PET usage. Hence, seven hotels and seven restaurants were picked for interviews as represented in Figure 73. It was found that even small-scale hotels and restaurants have high PET consumption.

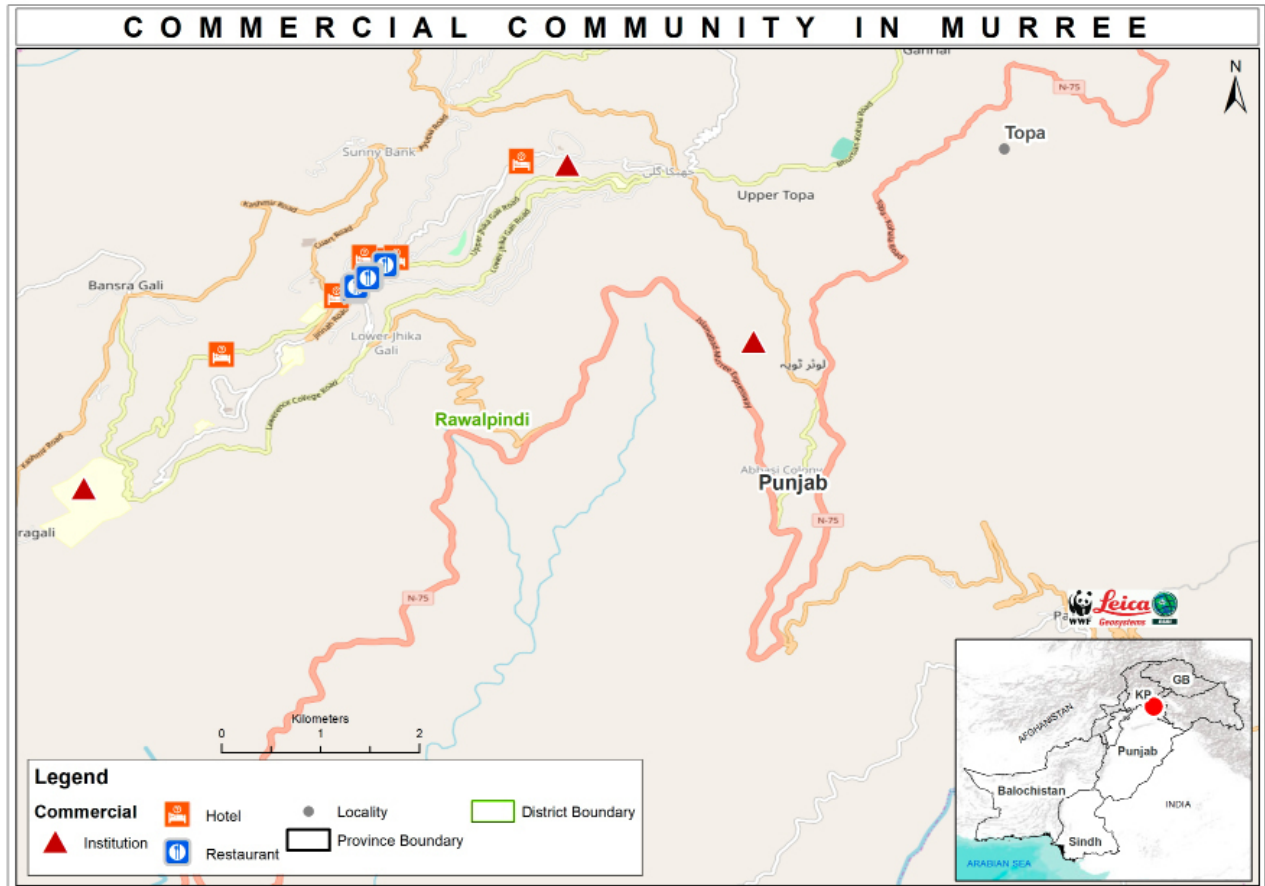
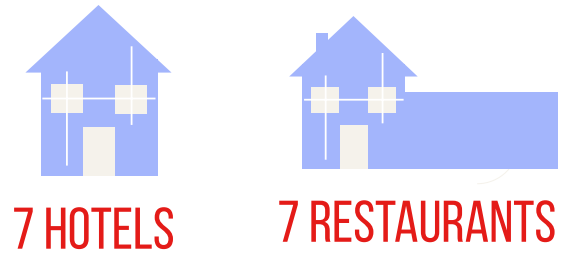
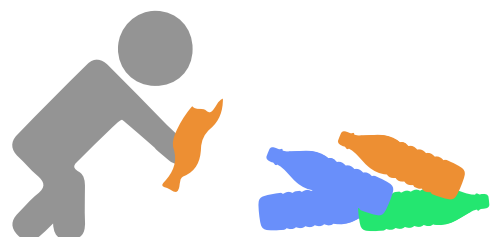


Figure 73: Locations of interviews conducted with hotels, restaurants and institutions

It was found that even small-scale hotels and restaurants have high PET consumption.

According to Figure 74, it was found that almost 59 percent of the total commercial sector segregated waste into recyclable and non-recyclable items. These items are collected by the janitorial staff and sold to junk dealers.



MURREE'S COMMERCIAL SECTOR ON SEGREGATING THEIR WASTE

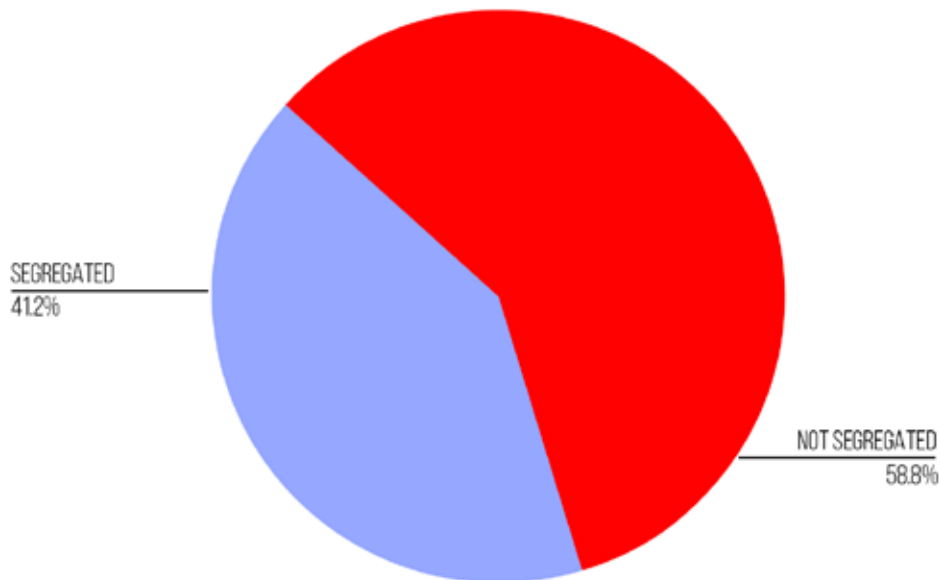


Figure 74: Murree's commercial sector on segregating their waste

Figure 75 represents the average usage of PET by each restaurant, hotel and school on a monthly basis. According to the chart, both hotels and restaurants consume a significant and equally high amount of PET (43 kg per month). On the other hand, there is a very small amount of PET waste produced in institutions.

43 KG

amount of PET consumed
by hotels and restaurants

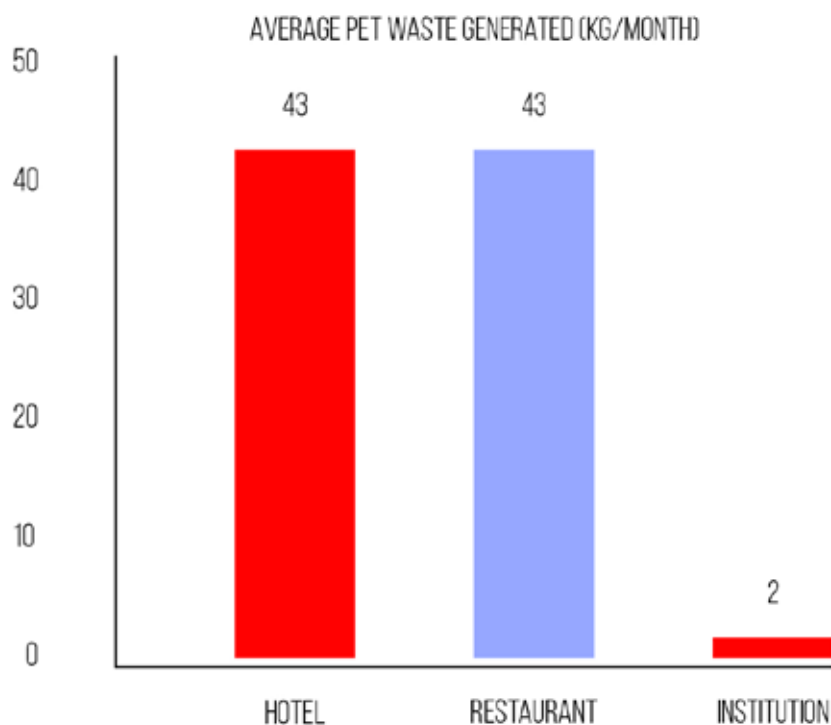


Figure 75: Amount of PET consumed in each commercial sector of Murree, in kg per month

5.2.4.4 SCAVENGERS

Four scavengers were interviewed in Murree. Their locations are marked in Figure 76. On average, the total amount of PET waste collected by one scavenger in Murree is 11.25 kg

per day. These pickers mostly collect their waste from Murree Mall Road, as a majority of the hotels, restaurants and institutions are situated in this area. Upon asking, all the scavengers interviewed were willing to provide their PET to a recovery facility.

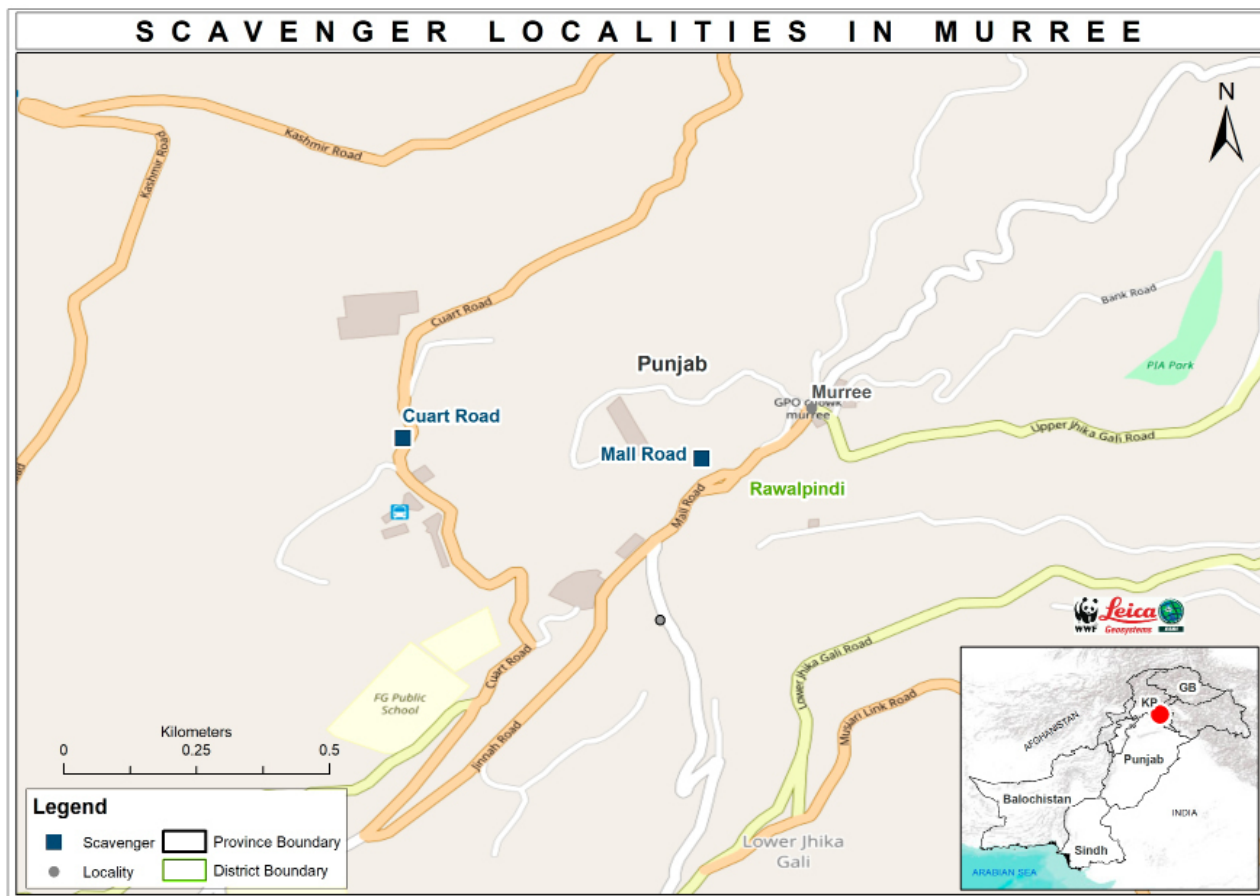


Figure 76: Localities of scavengers, Murree



Figure 77: Pile of PET waste collected by a scavenger for selling.



All the scavengers interviewed were willing to provide PET to a recovery facility.

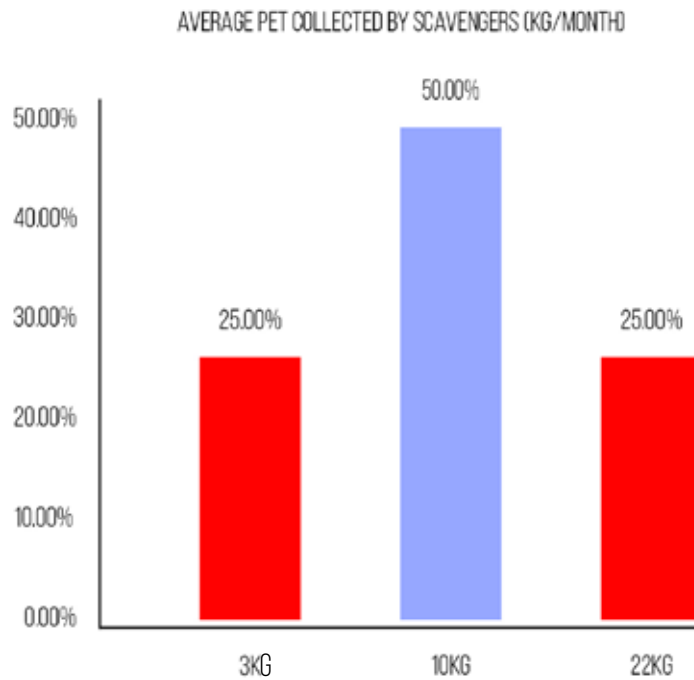


Figure 78: Average amount of PET collected by scavengers in Murree

Figure 78 shows that 50 percent of scavengers responded that they collect about 10 kg of PET per day, while 25 percent said that they collect 3 kg and 22 kg of PET waste in a day. These pickers mostly collect their waste from Murree Mall Road. When asked, all the scavengers interviewed were willing to provide their PET to a recovery facility.

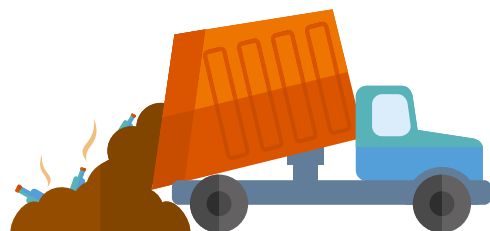
These 4 scavengers also had a transportation vehicle to send all recyclables to a larger junk dealer located in Abbottabad. According to them, they transport recyclables almost every other day and incur a cost of PKR 1,500 per day for transportation.

50 %

scavengers responded that they collected about 10 kg of PET per day.

25 %

scavengers responded that they collected about 3 kg and 22 kg of PET per day.



It costs PKR 1,500 per day for transportation of recyclables.

5.2.4.5 JUNK DEALERS

Two junk dealers were interviewed in Murree; their locations are marked in Figure 79.

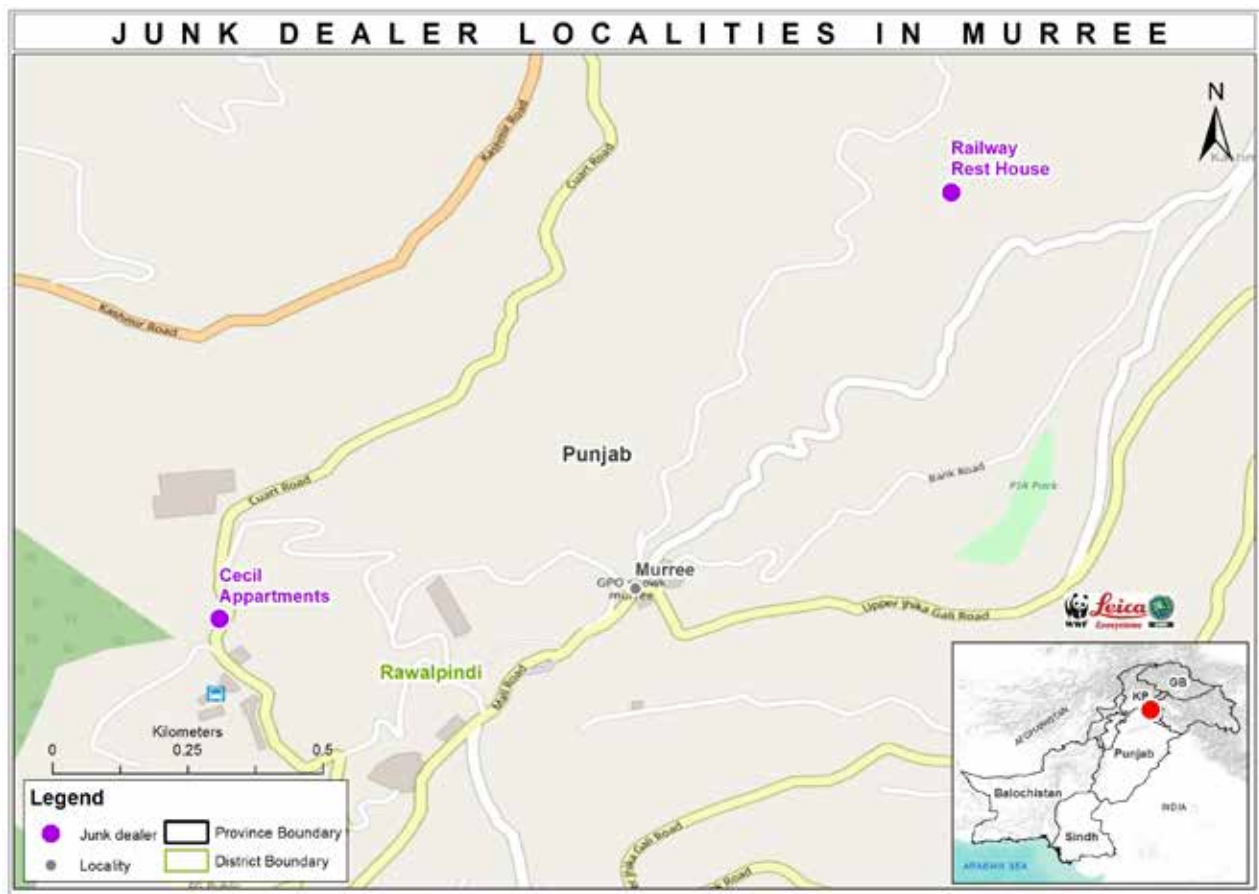
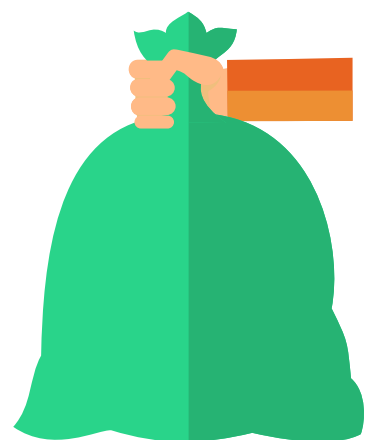


Figure 79: Localities of junk dealers, Murree

Both junk dealers bought PET with mixed waste. According to them, it was cheaper to buy and also the scavengers didn't sell it separately as depicted in Figure 80.



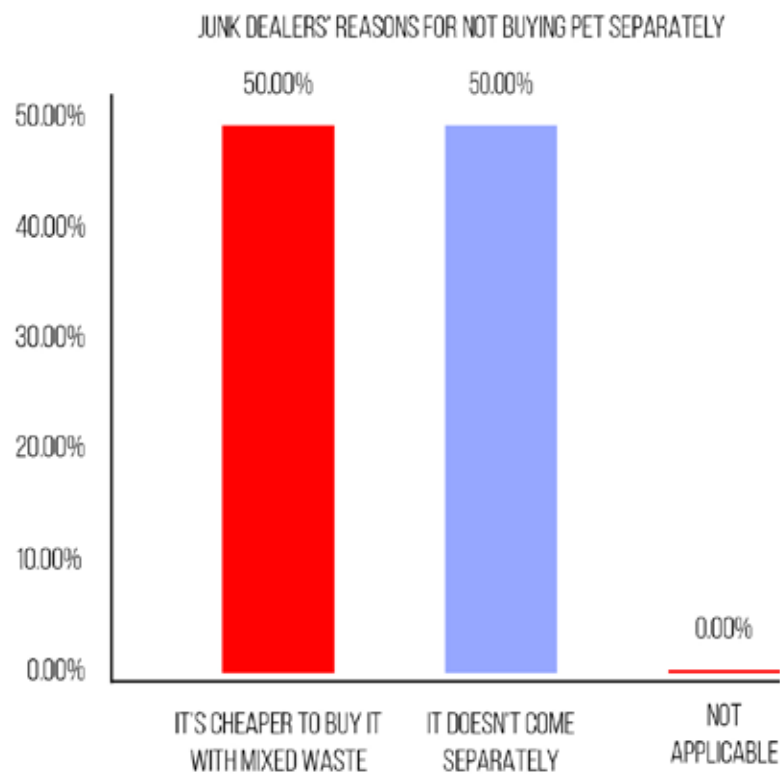


Figure 80: Junk dealers' reasons for not buying PET separately



Figure 81: Segregated PET bottles at a junk dealer in Murree

5.2.4.6 RECYCLER

Only one recycler could be traced in Murree. The unit was located on Kuldana Road where used PET is crushed, compacted to reduce the surface area, packed into large sacks and transported to recyclers in Abbottabad and Rawalpindi. The recycler’s location is marked in Figure 82.

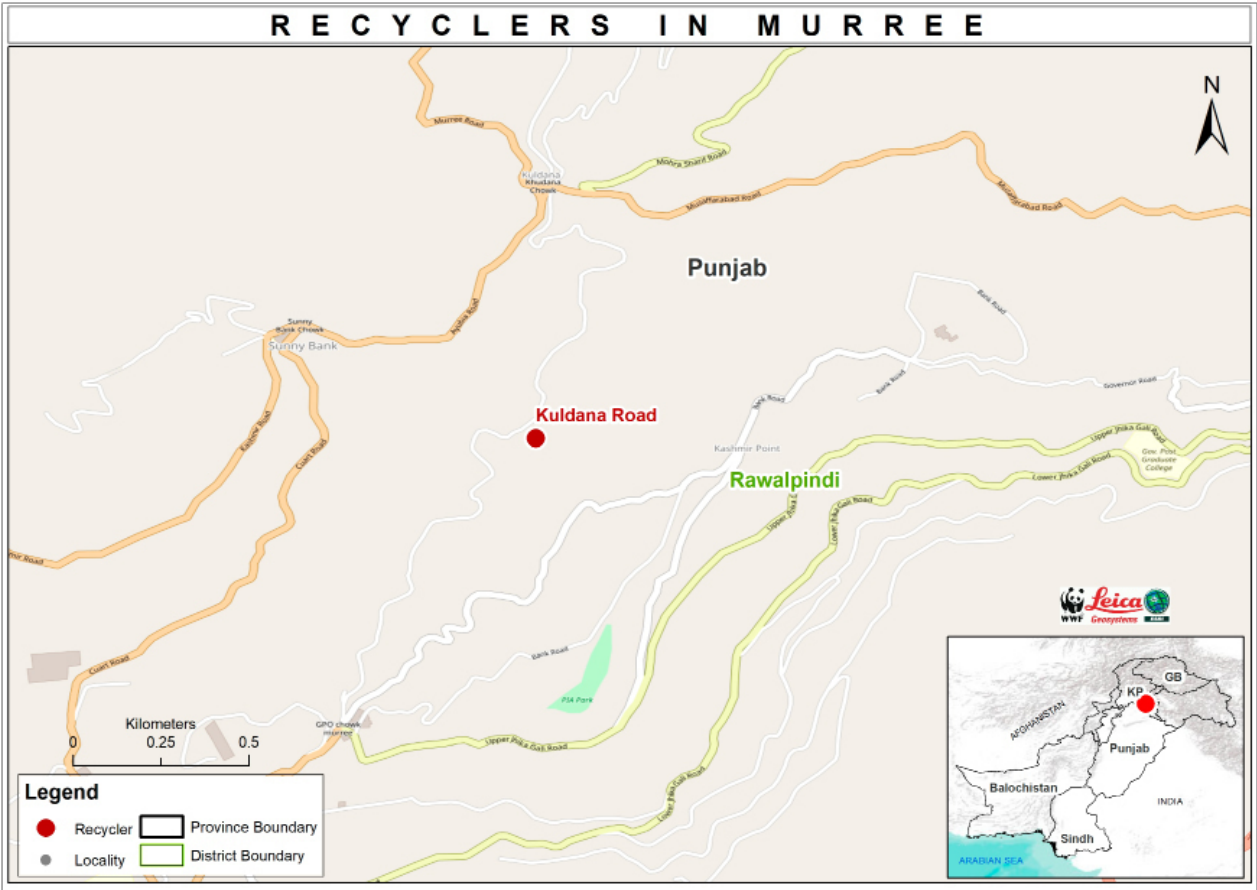
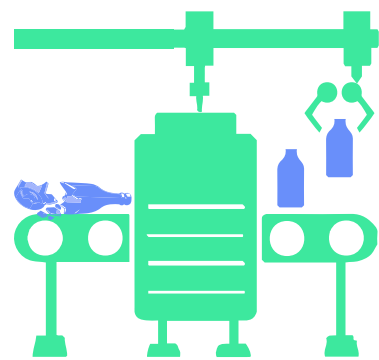


Figure 82: Location of a recycler in Murree

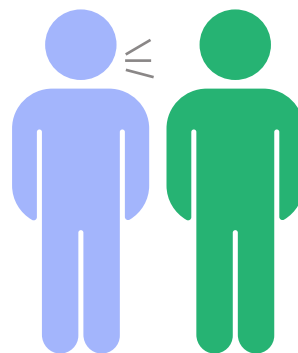
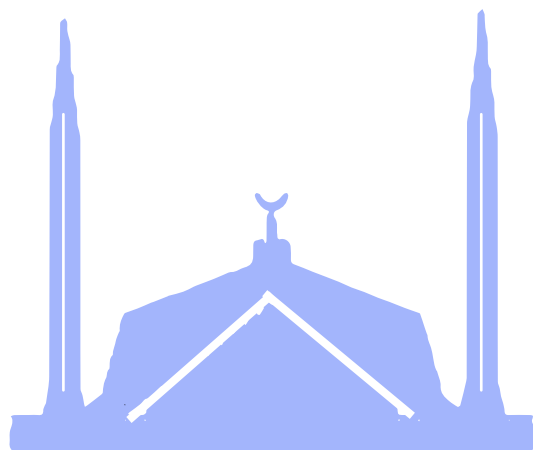


Figure 83: Crushed PET bottles packed in sacks

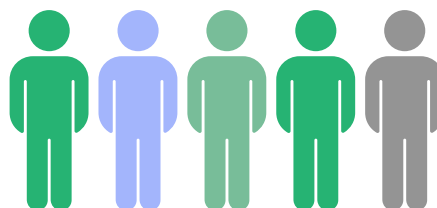


5.2.5 ISLAMABAD

Visits to Islamabad were carried out in the month of April 2019 and almost 635 respondents from households, the commercial sector and PET supply chain were interviewed.



635 people were interviewed from households, the commercial sector and PET supply chain.



5.2.5.1 WASTE MANAGEMENT COMPANIES

The Metropolitan Corporation Islamabad (MCI) and the Capital Development Authority (CDA) work collaboratively in the city to collect waste and transfer it to an open dumpsite located in I-12. Despite having a designated dumpsite and high collection efficiency, CDA is not able to segregate waste due to lack of technology and resources. Furthermore, most PET is already segregated by scavengers before the waste reaches the dumpsite.

According to CDA, waste contains only 1 % PET waste after scavengers scour through it.

5.2.5.2 HOUSEHOLDS

Almost 500 individuals filled out the survey questionnaire through door-to-door interviews and by circulating an online survey sheet. The respondents provided information on the major constituents of plastic waste in their households, their awareness on plastic pollution and their willingness to segregate waste at source. Their locations are marked in Figure 84.



Locations of households marked in Figure 84

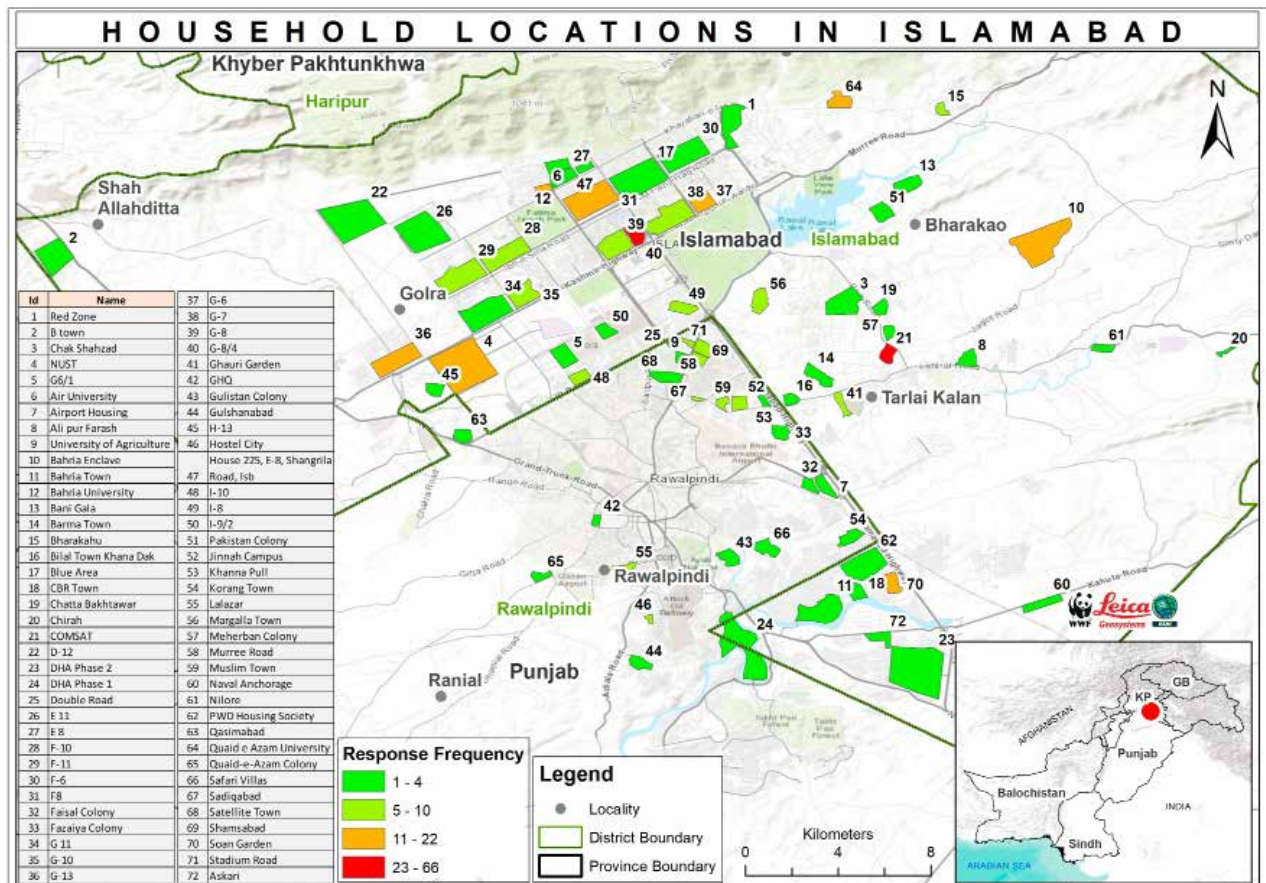


Figure 84: Localities of households, Islamabad

500 individuals filled out the survey questionnaires through door-to-door interviews and by circulating an online survey sheet.

500 INDIVIDUALS

filled survey questionnaires

Figure 85 shows that almost 47 % of households claimed their waste is collected by CDA, while over 36 % claimed it is collected by private collectors. Additionally, 10.32 % of respondents said their waste was not collected by anyone.



47 % claimed their waste is collected by CDA.

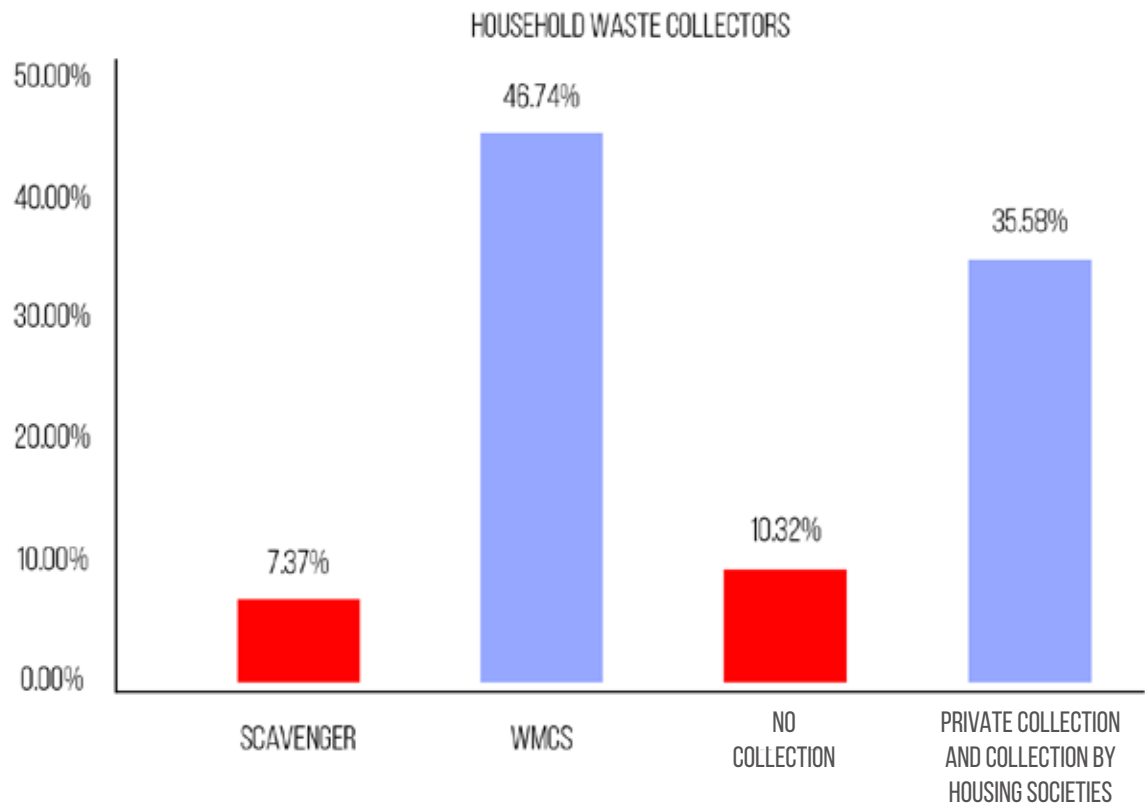


Figure 85: Major waste collectors in Islamabad's households

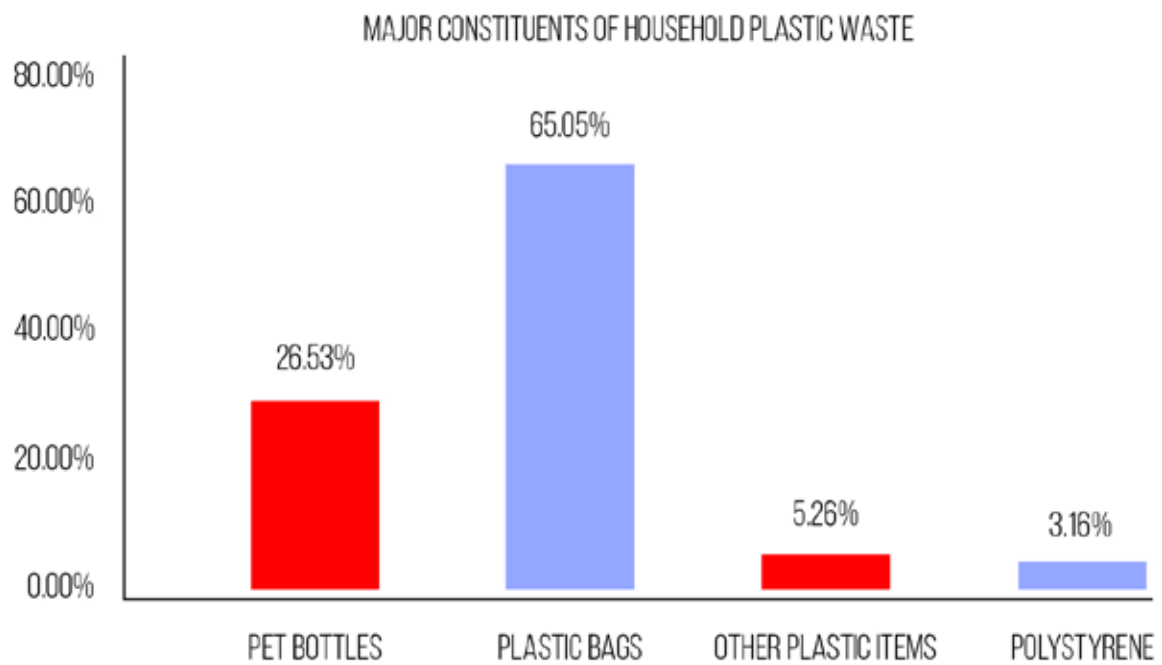


Figure 86: Major constituents of plastic waste in Islamabad

According to the citizens of Islamabad, the major component of their plastic waste consists of plastic bags (65 percent), whereas 26 percent claimed that PET bottles are disposed the most in their homes as compared to other plastic items.

Upon analysis, it was found that almost 89 percent of respondents in Islamabad were willing to provide their PET to a recovery facility, as depicted in Figure 87.

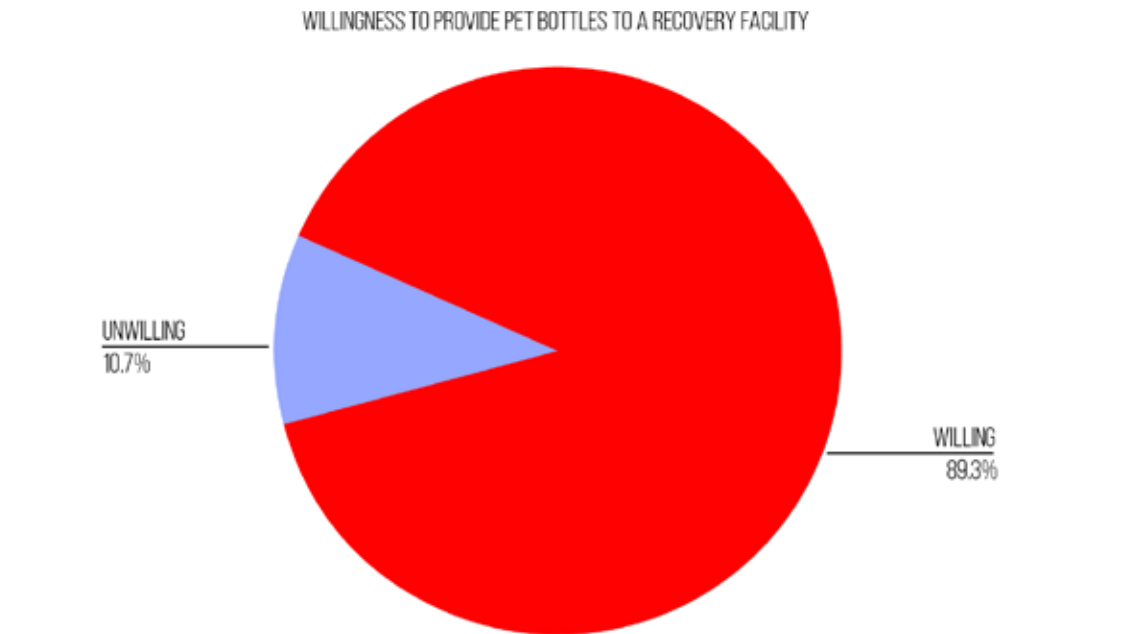


Figure 87: Willingness of citizens to provide PET to a recovery facility

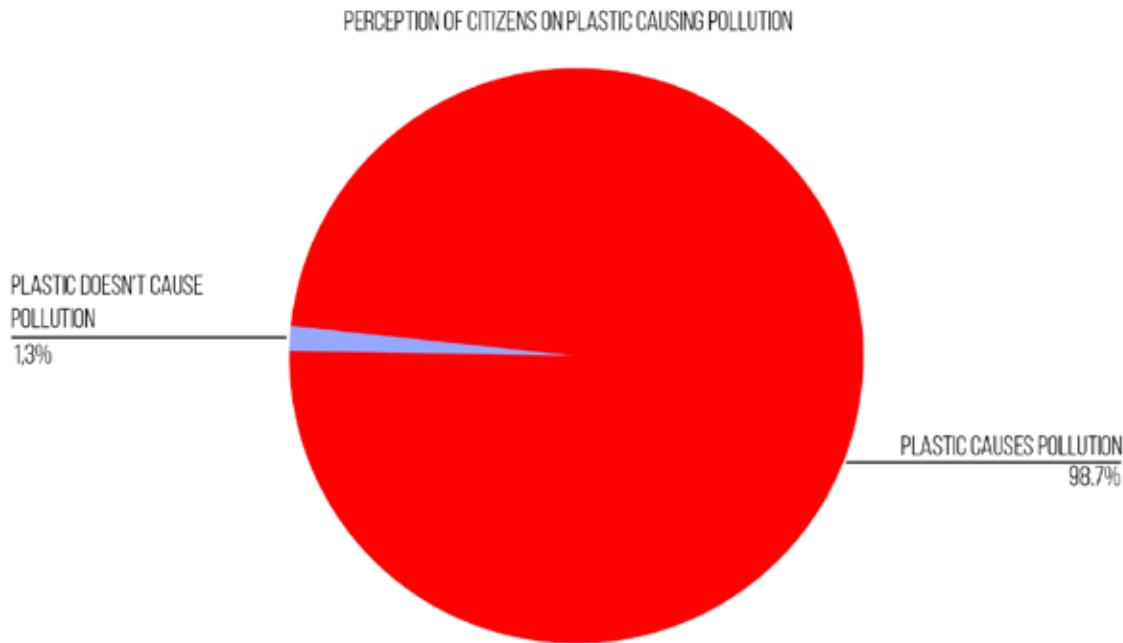


Figure 88: Respondents’ opinion on plastic causing pollution in land and water

According to Figure 88, 99 percent of household respondents of Islamabad were of the opinion that plastic causes pollution on land and in water.

99 %
of households believe that plastic causes pollution.

5.2.5.3 COMMERCIAL SECTOR

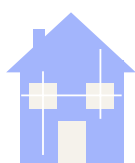
A total of 20 hotels, restaurants and institutions were interviewed in Islamabad to gather information about the average amount of PET consumption in each sector. Locations have also been marked in Figure 89.

20

hotels, restaurants and institutions visited.



Figure 89: Commercial community locations in Islamabad



HOTELS



RESTAURANTS



INSTITUTIONS

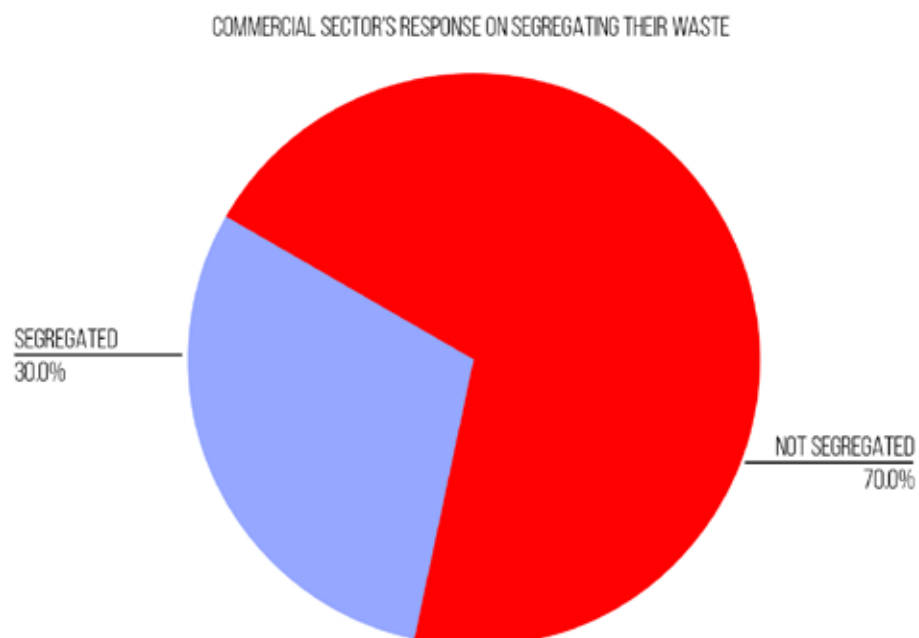


Figure 90: Response of Islamabad's commercial sector on segregating their waste

According to responses from hotels, institutes and restaurants, only 30 percent segregated their waste and sold PET to junk dealers.

As seen in Figure 91, an average of 1,394 kg of PET bottles are used per month per hotel, while a restaurant produces a mere 39 kg per month of PET waste and an institute generates about 97 kg per month of PET waste.

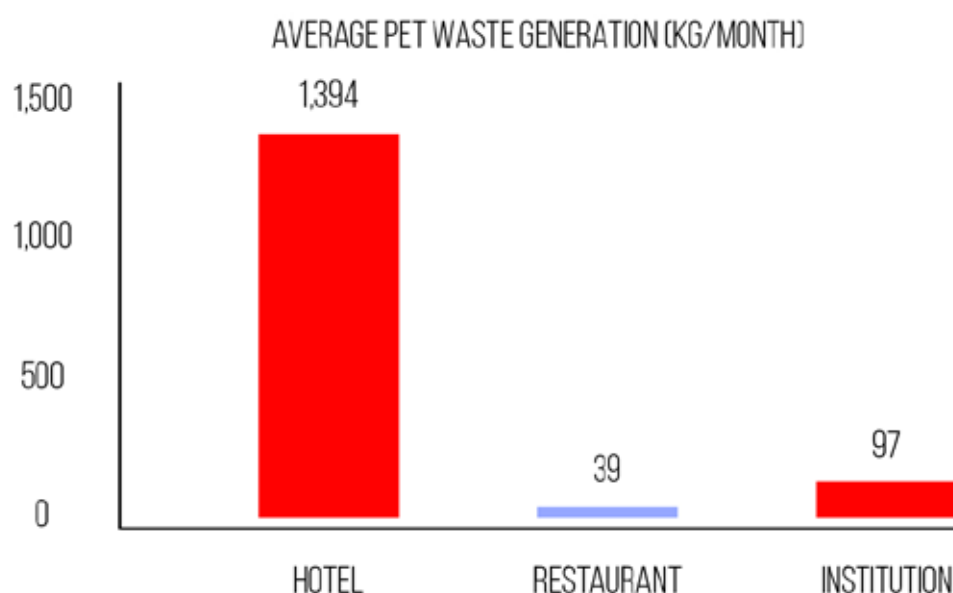
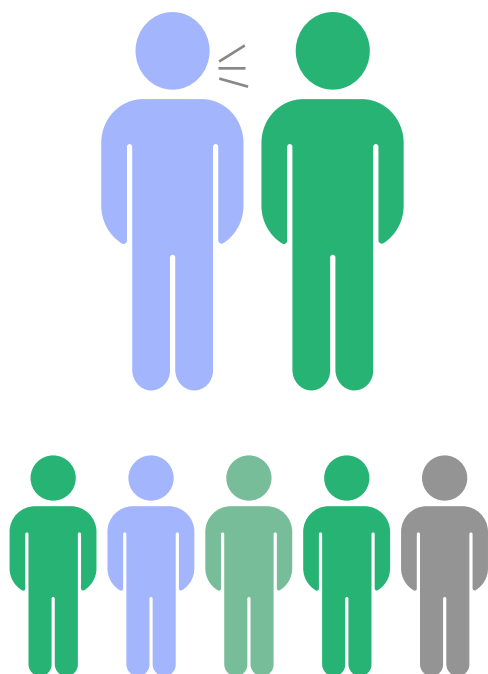


Figure 91: Average amount of PET consumed in each commercial sector of Islamabad

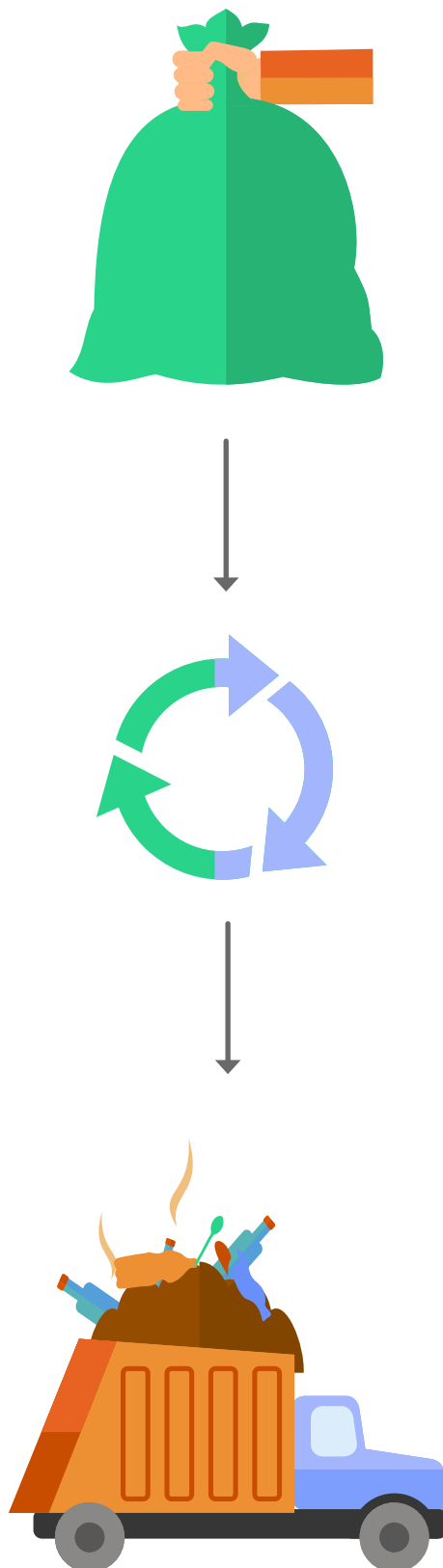
5.2.5.4 SCAVENGERS

Despite being a highly urbanized city, there are still sites where scavengers or waste pickers segregate waste. Most of these areas are located in the G sector of Islamabad.

During the visits conducted in Islamabad in May 2019, with the help of CDA, scavengers were tracked and interviewed. Their locations are marked on the map in Figure 92.



Scavengers were tracked and interviewed.



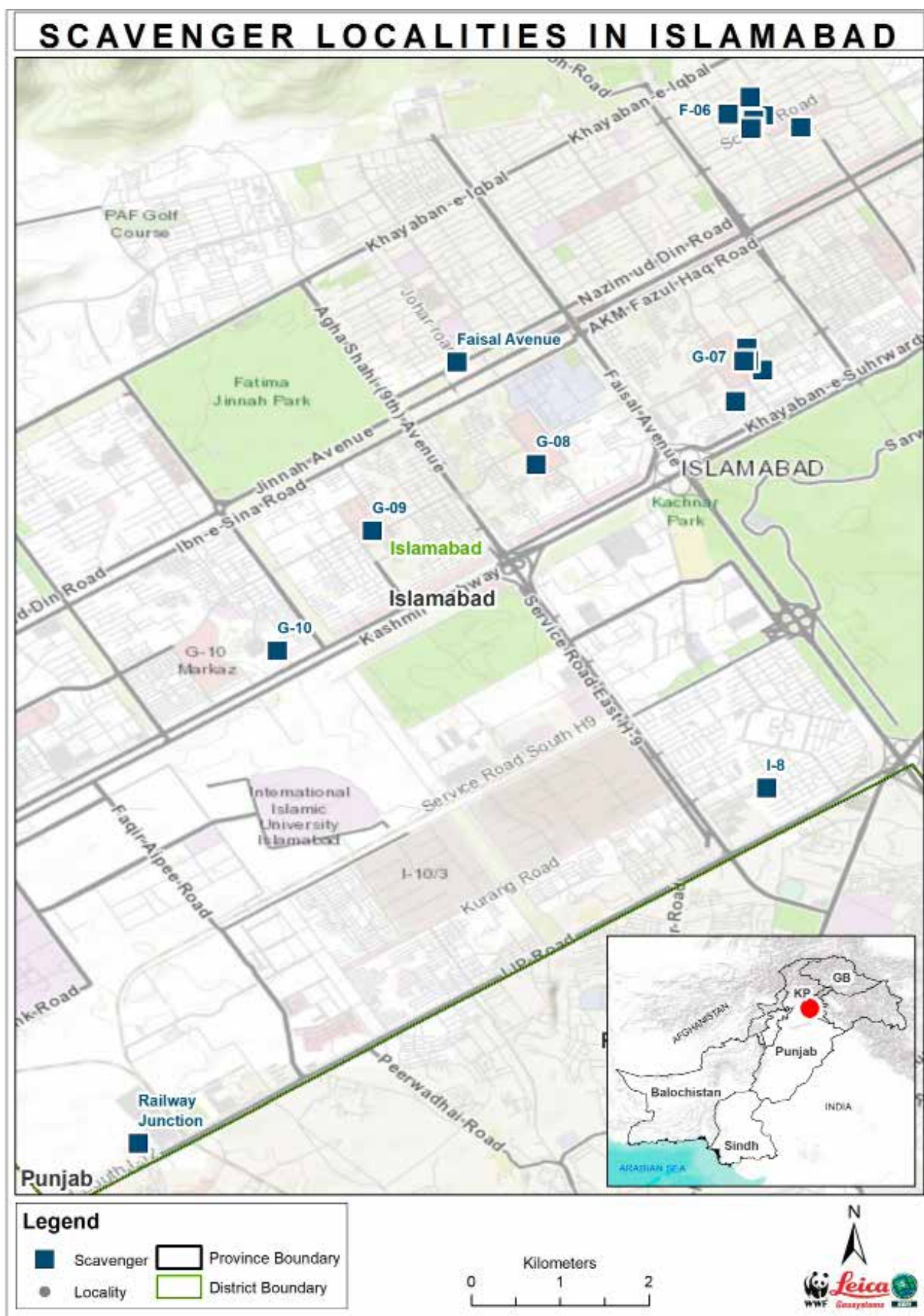


Figure 92: Scavenger locations, Islamabad

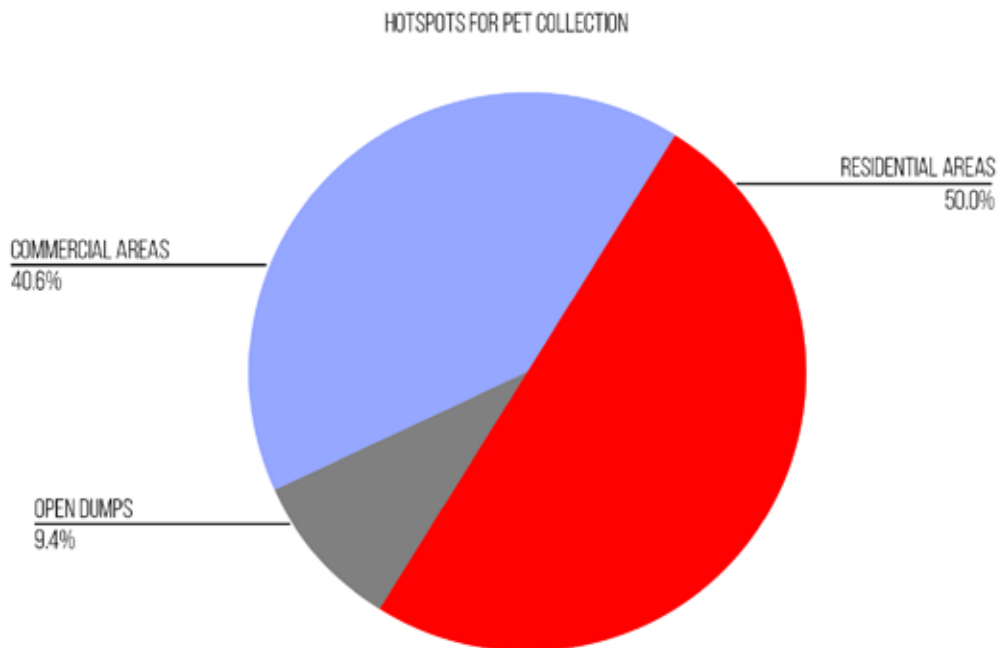


Figure 93: Hotspots in Islamabad for PET collection

The pie chart in Figure 93 shows that 50 percent of PET bottle waste is collected by scavengers from residential areas. The remaining PET is collected from commercial areas as well as open dumps.

Almost 68 percent of scavengers interviewed were willing to supply PET bottles to recovery facilities. The rest were satisfied with the current supply chain, as shown in Figure 94.

68 %

of scavengers were willing to provide PET bottles to a recovery facility.

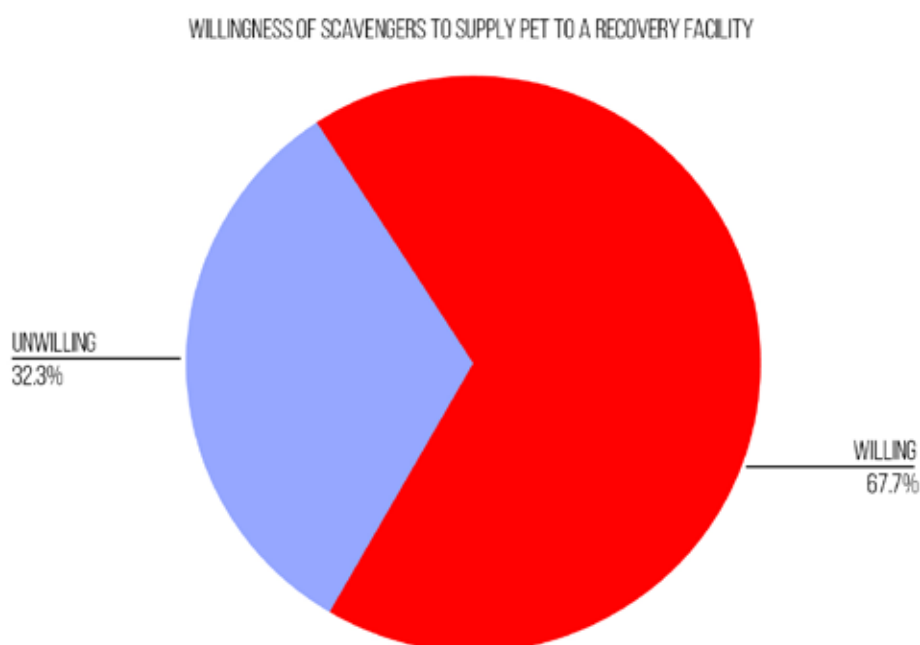


Figure 94: Willingness of scavengers to supply PET

5.2.5.5 JUNK DEALERS

Interviews with junk dealers were held in Islamabad in May 2019. A total of 22 junk dealers in ICT filled out questionnaires and provided information about their mechanism of acquiring PET and their willingness to work in a more formalized setup. Their locations are presented on the map in Figure 95.

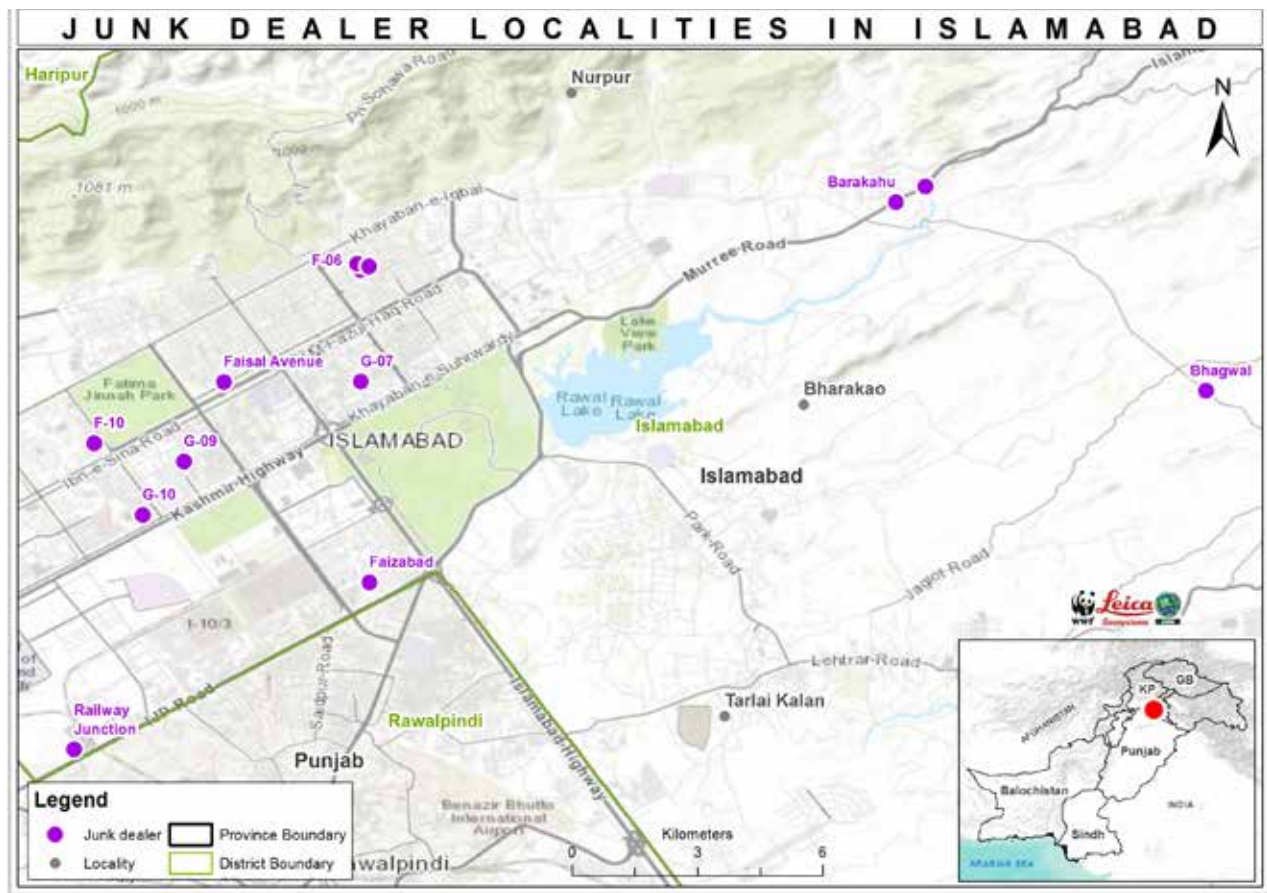
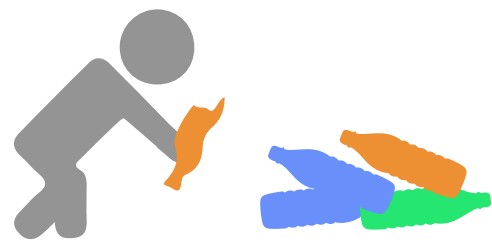


Figure 95: Localities of junk dealers, Islamabad

22 junk dealers in ICT filled out questionnaires and provided information about their mechanism of acquiring PET.



JUNK DEALERS ON BUYING SEPARATELY OR WITH OTHER WASTE MATERIALS

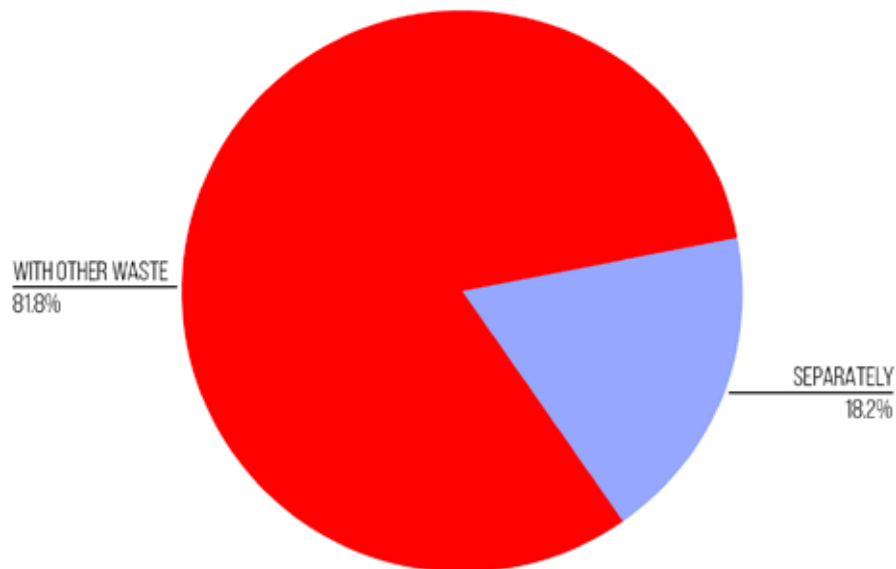
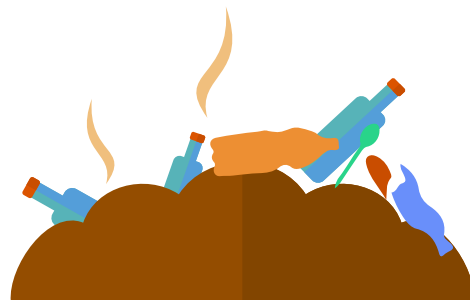


Figure 96: Islamabad's junk dealer's response to buying PET separately or with other waste materials

Almost 82 percent of survey participants purchased PET with mixed waste, while the rest bought it from scavengers who sold it separately as portrayed in Figure 96. Almost 52 percent responded that they buy PET with other waste materials because it does not come separately. Furthermore, 42 percent of junk dealers also stated that buying PET with other items is very cheap as compared to buying it separately, as shown in Figure 97.



REASONS FOR PURCHASING PET WITH OTHER MATERIALS

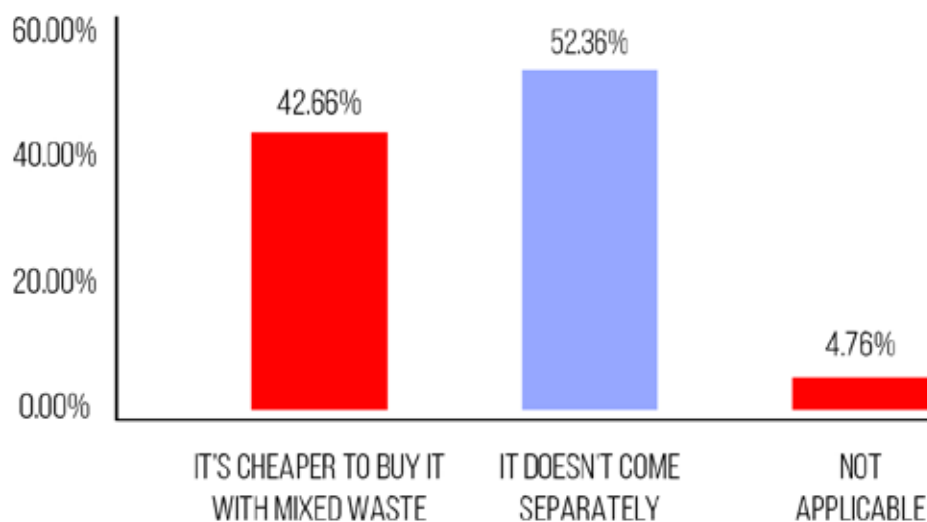


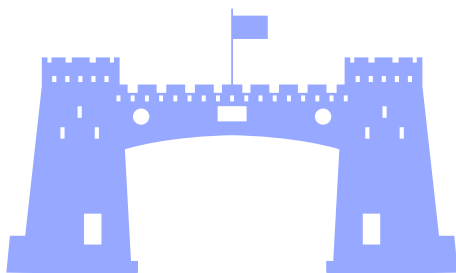
Figure 97: Reasons for purchasing PET with other materials



Figure 98: Heap of PET bottles at a junk dealer's warehouse

5.2.6 PESHAWAR

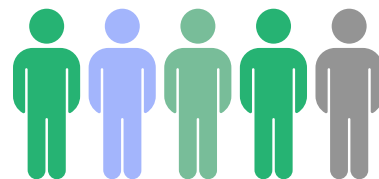
Visits to Peshawar were carried out in the month of April 2019 and almost 300 respondents from households, the commercial sector and the PET supply chain were interviewed.



5.2.6.1 WASTE MANAGEMENT COMPANIES

Public waste management companies in Peshawar, including Peshawar Development Authority (PDA) and Water Sanitation and Services Peshawar (WSSP), were interviewed and were asked to fill out questionnaires.

According to WSSP, the efficiency of their waste collection is 70 percent, which means that 800 tonnes out of 1,143 tonnes are collected per day. Like other waste management companies, WSSP does not segregate their waste due to lack of finances, technology, human resource, an improper waste supply chain and lack of community participation. Despite this, there are less than one percent PET bottles present in their collected waste, as waste pickers/scavengers gather the PET before it even reaches the dumpsite. Moreover, the WSSP staff was aware of the pollution caused by plastics on land and in water.



5.2.6.2 HOUSEHOLDS

Household questionnaires were conducted from the faculty and students at universities, as well as from the customers present at restaurants. Their household locations are mapped in Figure 99.

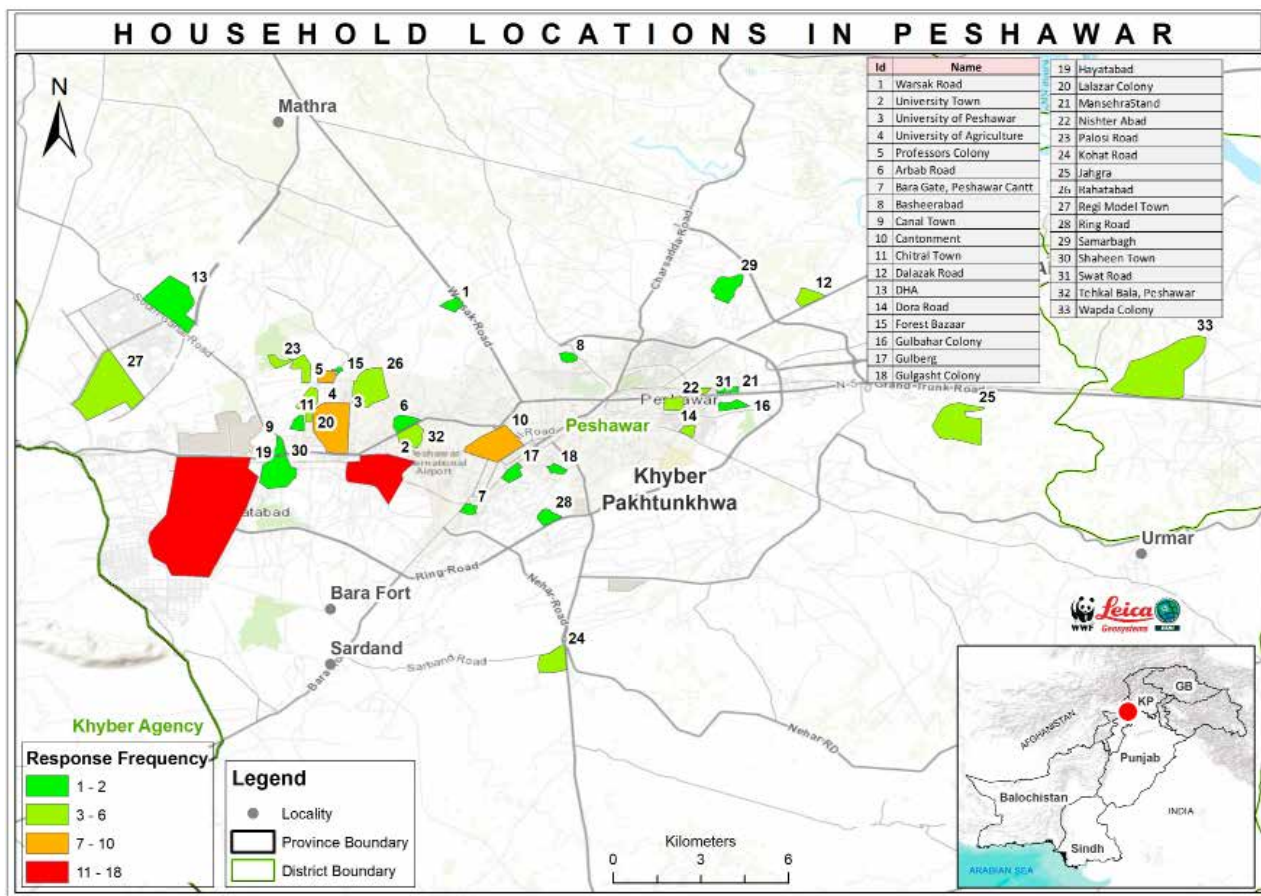


Figure 99: Household locations of respondents in Peshawar

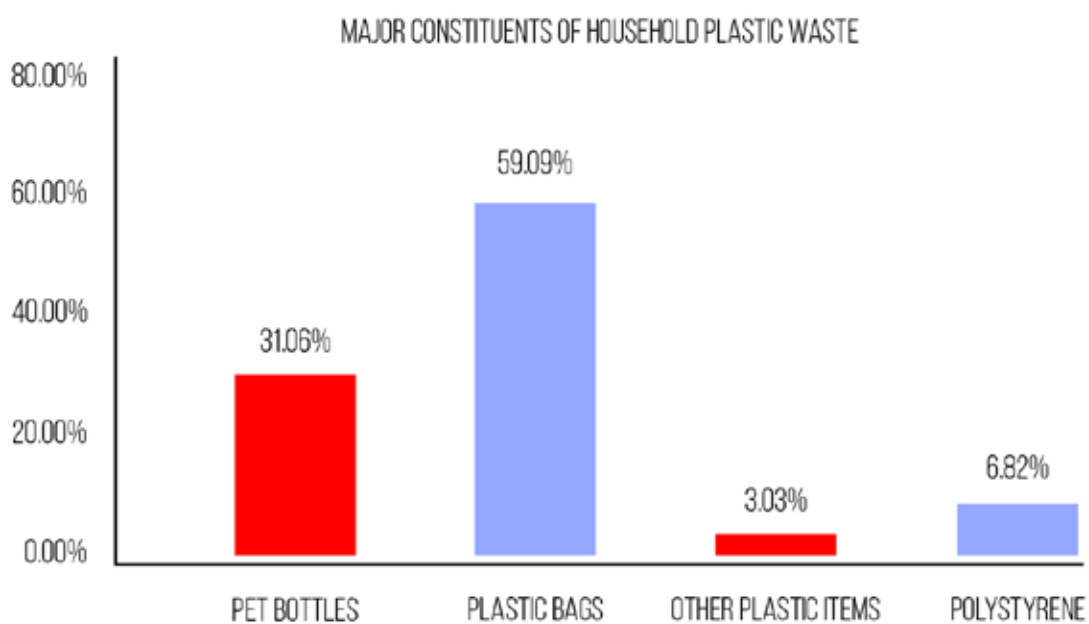


Figure 100: Major constituents of household plastic waste

According to Figure 100, the citizens of Peshawar claim that a major component of their plastic waste consists of plastic bags, which is 59 percent. Only 31 percent claimed that PET bottles are the most disposed items in their

homes as compared to other plastic items. Figure 101 depicts that 35 percent of households have private waste collectors picking up their waste, while only 12 percent claimed their household waste is picked up by scavengers.

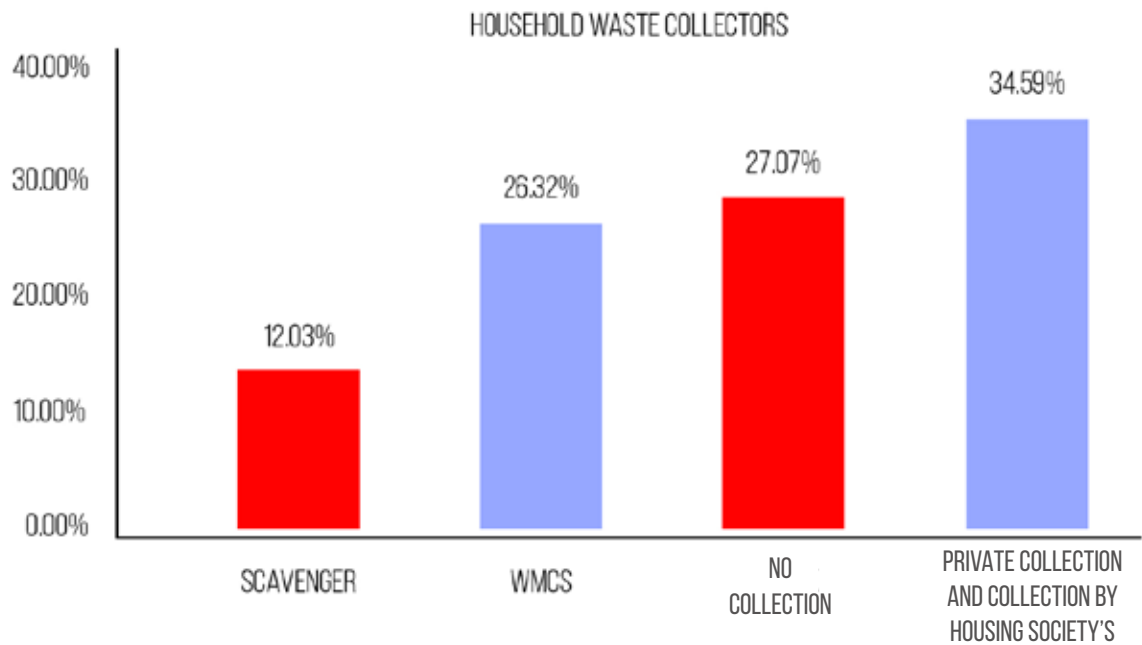


Figure 101: Major waste collectors in Peshawar’s households

Figure 102 depicts that almost 88 percent of citizens in Peshawar were willing to provide their PET to a plastic recovery facility.

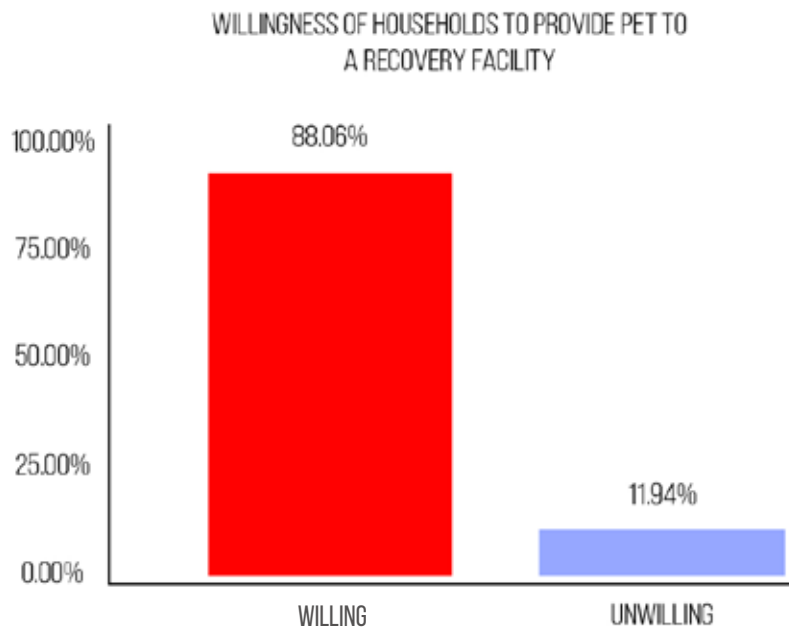


Figure 102: Peshawar’s citizens’ willingness to provide PET to a recovery facility

5.2.6.3 COMMERCIAL SECTOR

The map in Figure 103 reflects the commercial locations visited in Peshawar. Two hotels, five institutions and five restaurants were visited to conduct interviews and questionnaires.

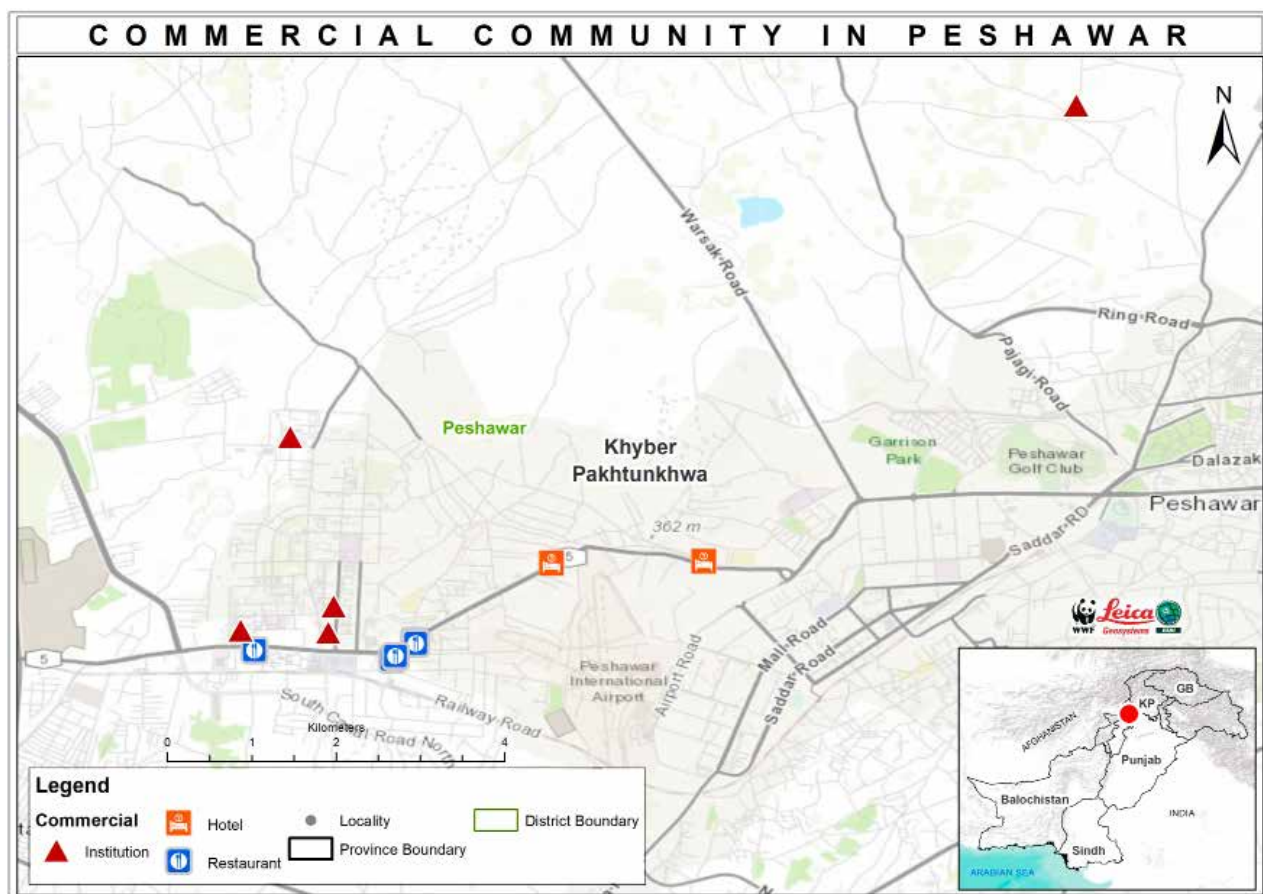
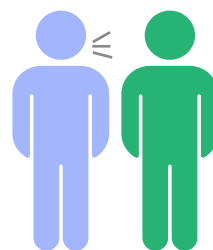
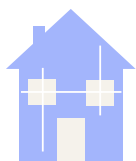


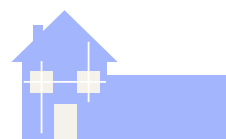
Figure 103: Commercial community in Peshawar



2 HOTELS



5 RESTAURANTS



5 INSTITUTIONS

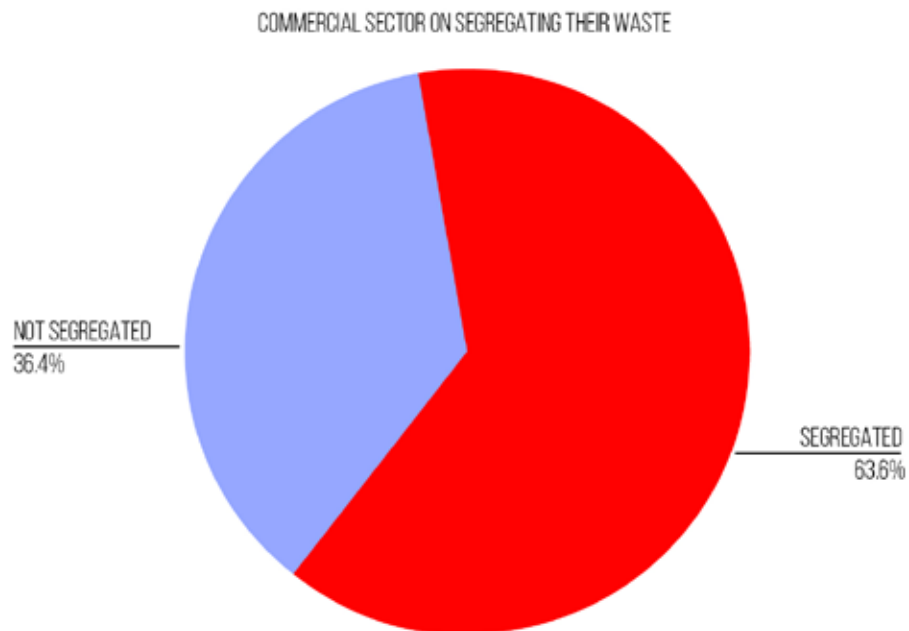


Figure 104: Response of Peshawar's commercial sector on segregating their waste

Figure 104 represents that the majority of Peshawar's commercial sector (64 percent) segregate their waste at source.

According to Figure 105, academic institutes are the highest PET bottle waste generators, while hotels generate PET waste in lesser quantities. An even smaller amount of PET waste is produced by restaurants since they mostly served canned beverages.

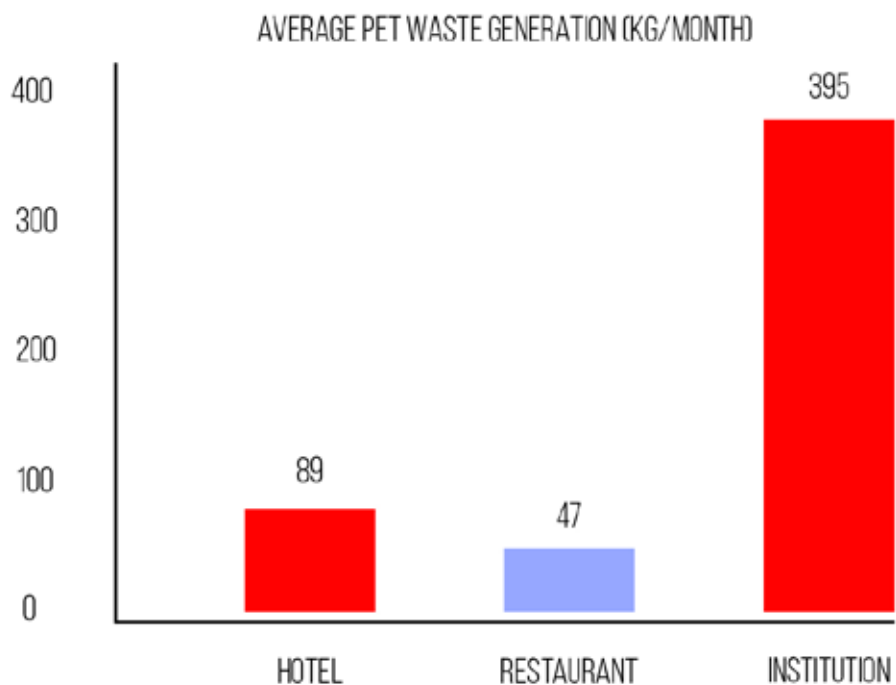
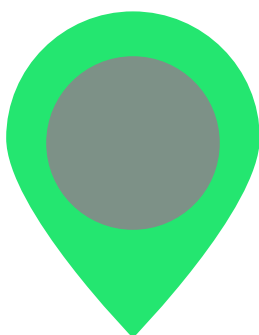
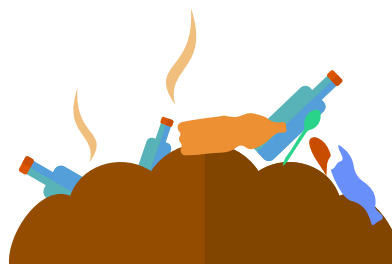


Figure 105: Amount of PET waste generated in kg per month

5.2.6.4 SCAVENGERS

Scavengers in Peshawar collected PET waste mainly from residential areas and a few picked it up from dumpsites as well. For this study, 17 scavengers were approached and their locations are marked on the map in Figure 106.



Localities of scavengers are marked in Figure 106



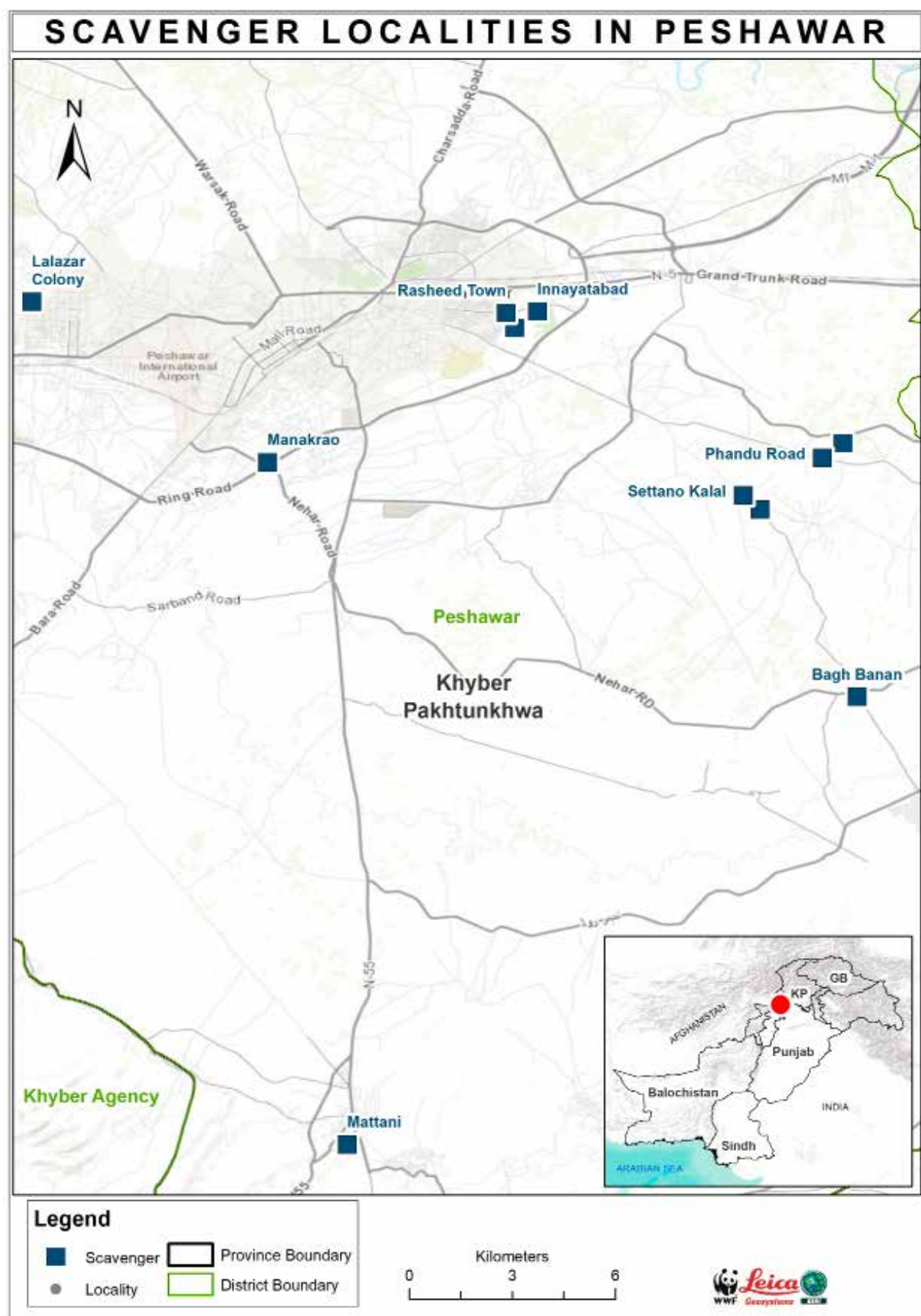


Figure 106: Scavenger locations in Peshawar

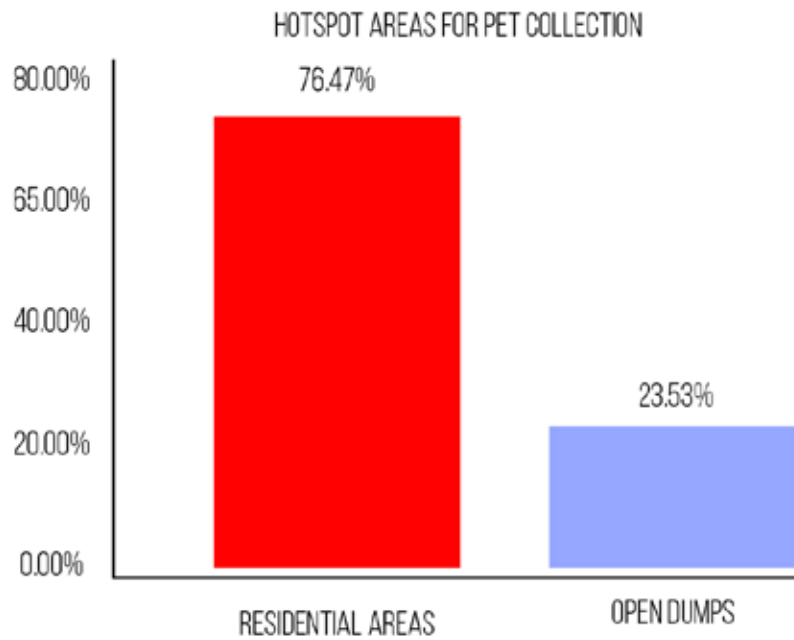


Figure 107: Hotspot areas for PET collection

The bar graph in Figure 107 represents that almost 76 percent scavengers collect PET waste from residential areas, and approximately 24 percent collect PET from dumpsites. These scavengers normally utilized hand or donkey carts to collect the waste and recyclables containing PET.

According to Figure 108, 95 percent of respondents were willing to supply PET to a plastic recovery facility in Peshawar. The rest were unwilling as they were either satisfied with the current collection mechanism or were hesitant to go against their current contractors.

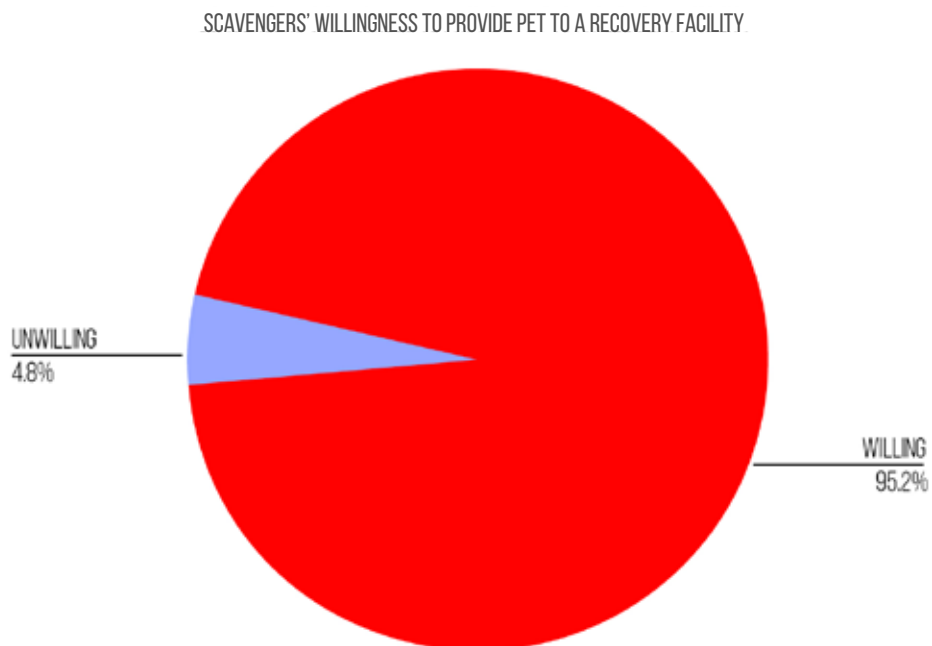


Figure 108: Scavengers' willingness to provide PET to a recovery facility

5.2.6.5 JUNK DEALERS

In Peshawar, junk dealers mostly acquired PET waste from scavengers along with other recyclables at an average rate of PKR 30 per kg. They later segregated the PET waste at a waste yard, which was sold to the nearby recyclers. The map in Figure 109 represents the locations of respondents in Peshawar; about four junk dealers were approached. It was found that all four junk dealers purchased their PET from scavengers with other waste materials.



Location of junk dealers is marked in Figure 109



Figure 109: Junk dealer localities in Peshawar

5.2.6.6 RECYCLERS

Two recyclers were found in Peshawar. One was situated in Rasheed Town with a PET crushing facility, where large quantities of PET waste were crushed into flakes, washed, dried and packed into sacks; these sacks were then transported to Lahore and Faisalabad.

Figure 111 depicts the granules made out of PET bottles. The second recycler interviewed converted the PET waste into small granules, which were being melted and made into hangers, albeit of low quality, to be sold in the local market as shown in Figure 113 and 114. Their locations have also been marked on the map in Figure 112.



Figure 110: A recycler's facility in Peshawar



Figure 111: PET bottles converted into granules at a recycling unit in Peshawar

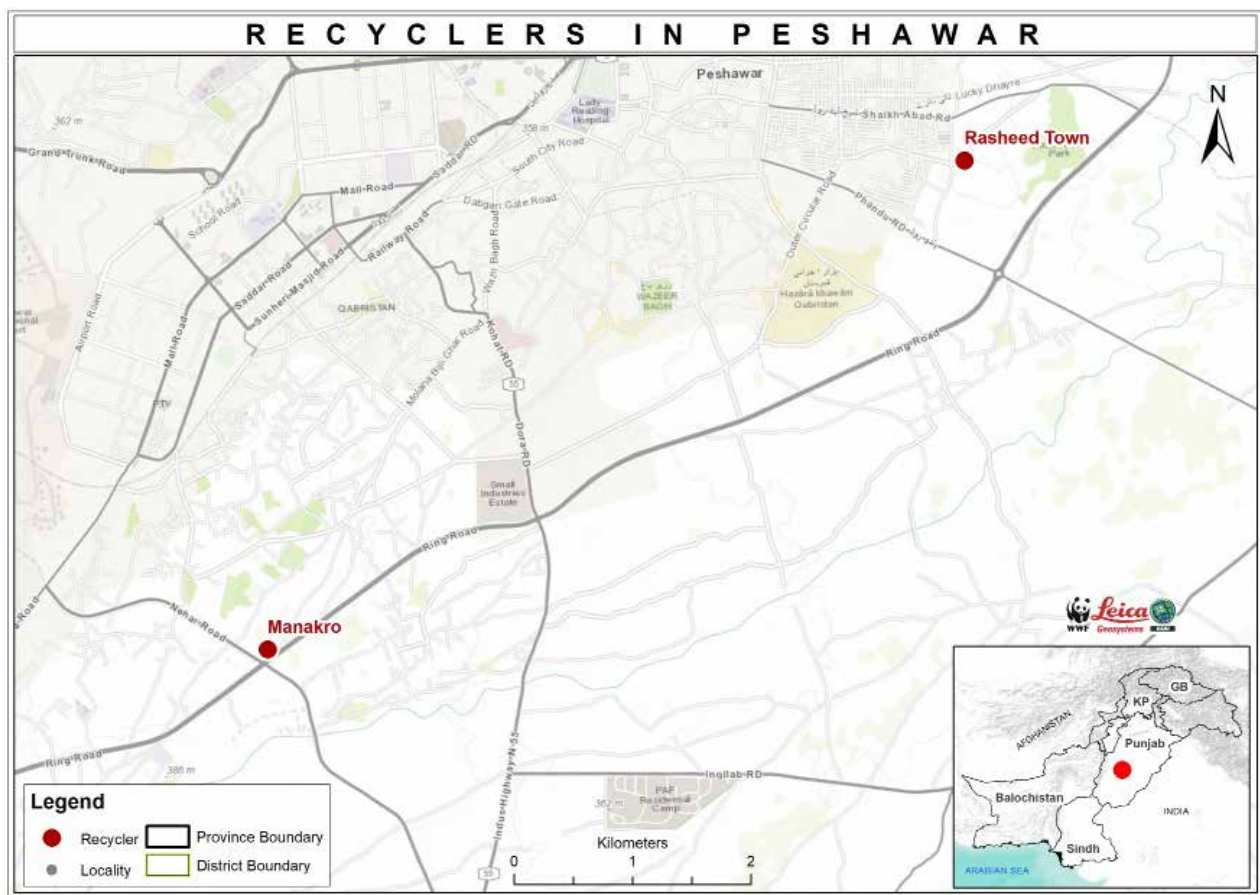


Figure 112: Recyclers in Peshawar

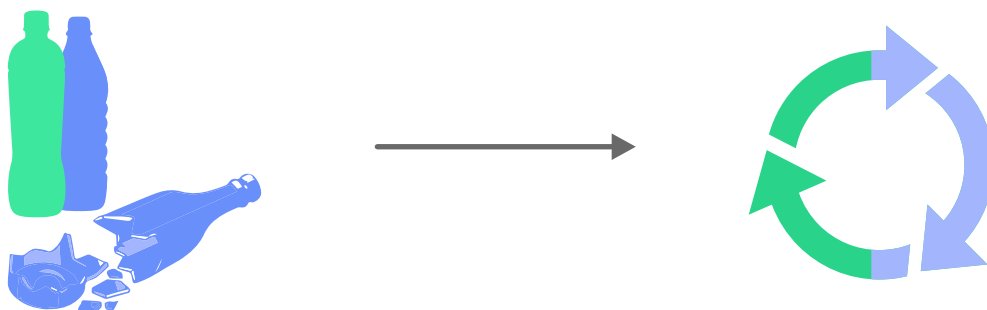




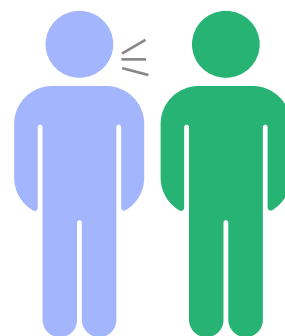
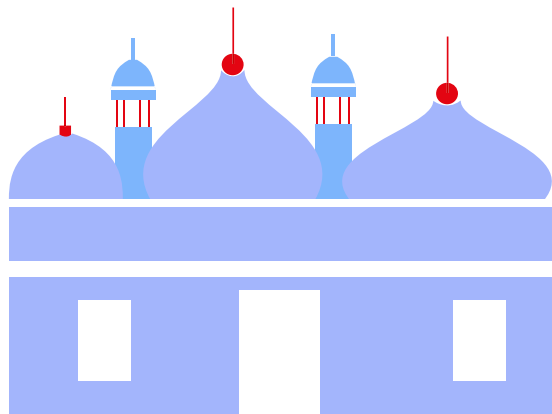
Figure 113: PET crushed and made into hangers by a recycler



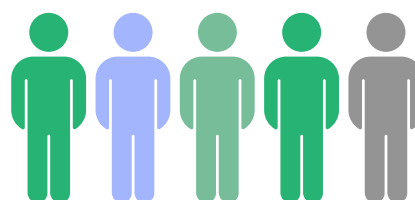
Figure 114: Heaps of PET at a recycler's facility in Peshawar

5.2.7 RAHIM YAR KHAN

Visits to Rahim Yar Khan were conducted in June 2019 and around 216 respondents from households, the commercial sector and the PET supply chain were interviewed.



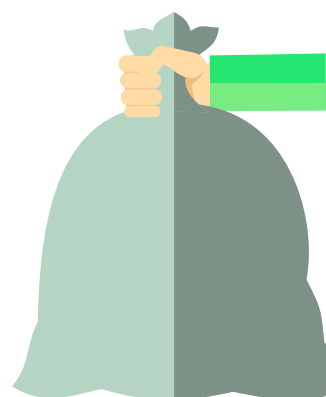
216 respondents were interviewed



5.2.7.1 WASTE MANAGEMENT COMPANIES

Waste management and provision of other municipal services under the ambit of Tehsil Municipal Administration (TMA) in Rahim Yar Khan (RYK). A TMA official was approached in order to fill the questionnaire; according to the facilitator, the maximum amount of PET waste is recycled, while only a small quantity of unsellable PET makes its way to dumpsites.

The TMA collects around 700 tonnes of waste from the city at a collection efficiency of 70 per cent. According to them, the reasons preventing them from segregating waste are inadequate finances, lack of equipment, lack of trained human resources and lack of awareness. Nevertheless, only a small fraction of PET is found in their collected waste as scavengers collect PET from source. As per their knowledge, only 50 percent of PET waste is recycled and less than five percent ends up in dumpsites while PET collection is mostly carried out by private collectors. A TMA representative also facilitated visits to the people involved in the PET supply chain, i.e. scavengers, junk dealers and recyclers.



TMA collects 700 tonnes of waste from the city.

50 %

waste is recycled.

5.2.7.2 HOUSEHOLDS

A total of 490 households completed the survey questionnaires. The participants of this study provided information on their current practices in waste disposal and the quantity of PET bottles used and disposed of in a month. In order to get a fair representation of answers, surveys were conducted across the city; the locations of these households are marked on the map in Figure 115.



490 households were surveyed

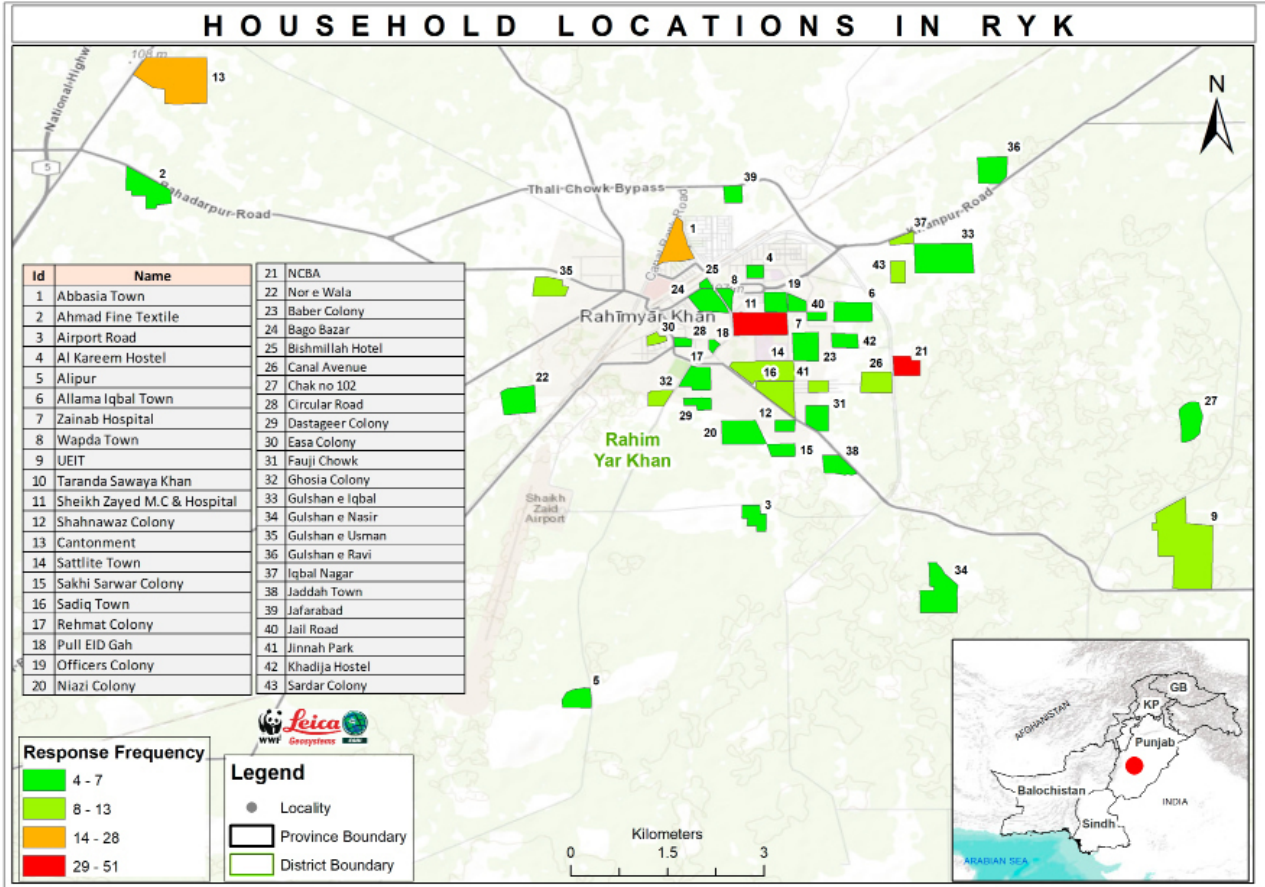


Figure 115: Household locations in Rahim Yar Khan

According to Figure 116, 52 percent of respondents claimed that a major component of their plastic waste consists of plastic bags, whereas 33 percent claimed that PET bottles are the most disposed items in their homes.



52 % of respondents claimed plastic bags were the major component of plastic waste.

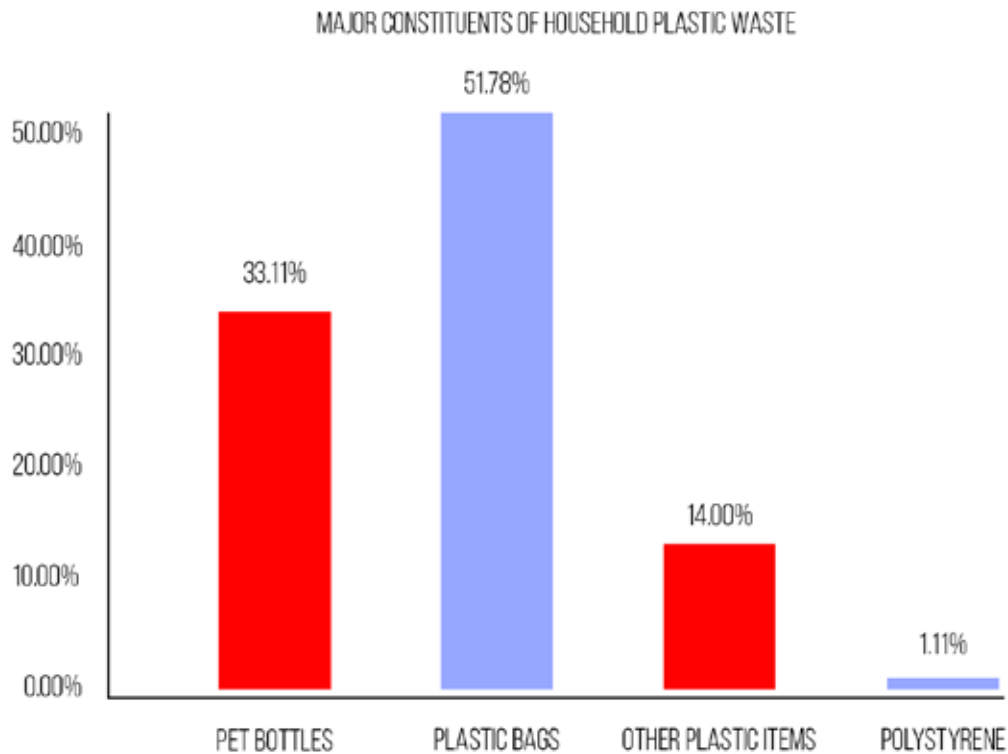


Figure 116: Major constituents of plastic waste in Rahim Yar Khan

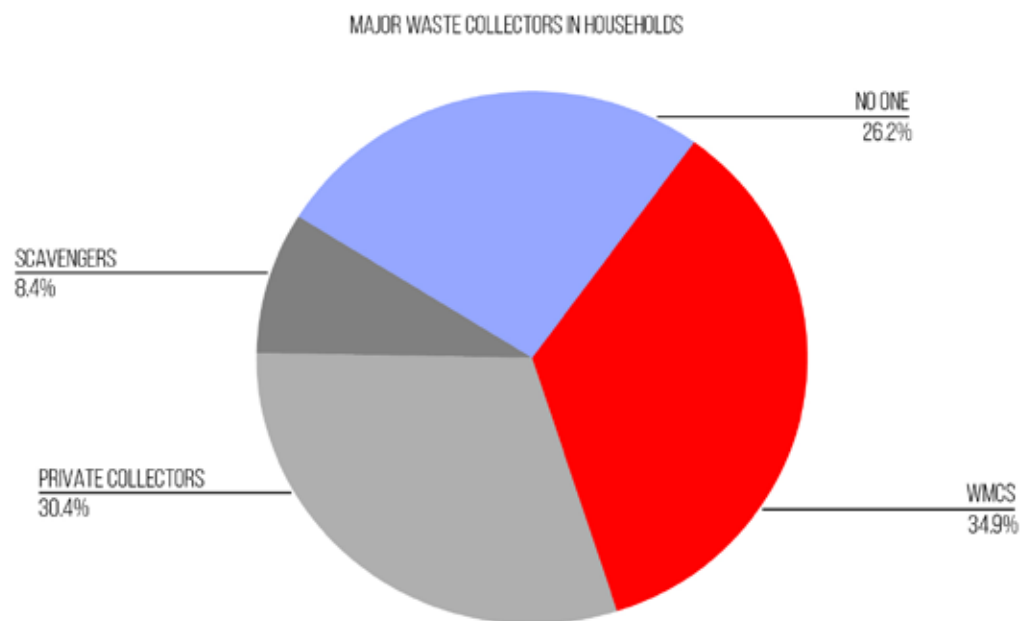


Figure 117: Major waste collectors in Rahim Yar Khan's households

Participants of the study were also questioned about their current waste collectors. The results in Figure 117 represent that waste management companies collect the waste of almost 35 percent of respondents, while private collectors collected waste from 30 percent of interviewees. Surprisingly, 26 percent of households claimed that their waste remains uncollected, which is why they openly dump their waste.

26 % of households claimed that their waste remains uncollected, which is why they openly dump their waste.

WILLINGNESS OF CITIZENS TO PROVIDE PET TO A RECOVERY FACILITY

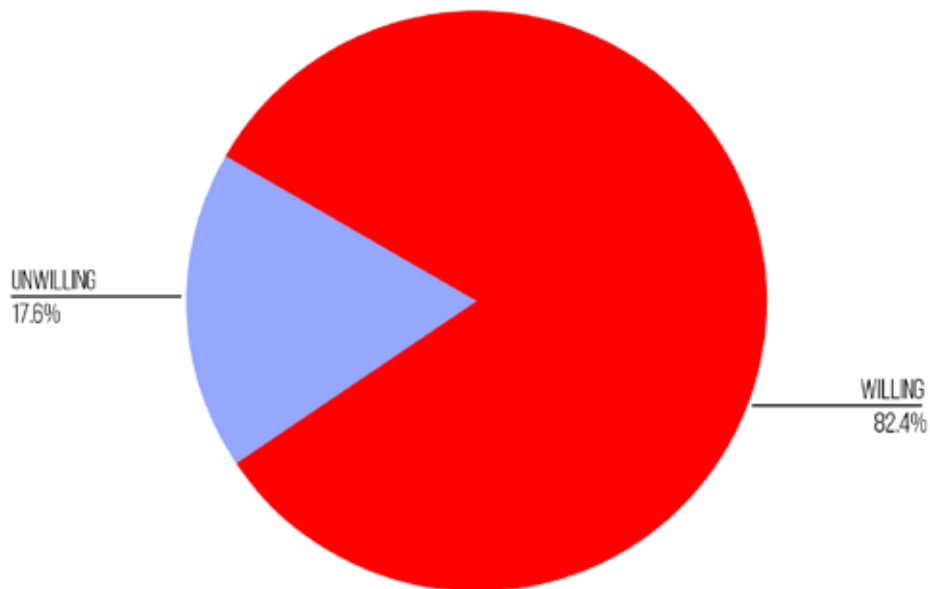


Figure 118: Willingness of Rahim Yar Khan's citizens to provide PET to a recovery facility

According to Figure 118, 82 percent of the individuals in Rahim Yar Khan were willing to provide their PET to a recovery facility.

82 %

individuals in
Rahim Yar Khan were
willing to provide their PET
to a recovery facility

Furthermore, about 97 percent households interviewed were aware that plastics causes pollution, while three percent of the respondents did not think that plastics were a cause of pollution, as shown in Figure 119.

97 %

households were aware
that plastic causes pollu-
tion.

CITIZENS' PERCEPTION ON PLASTICS CAUSING POLLUTION

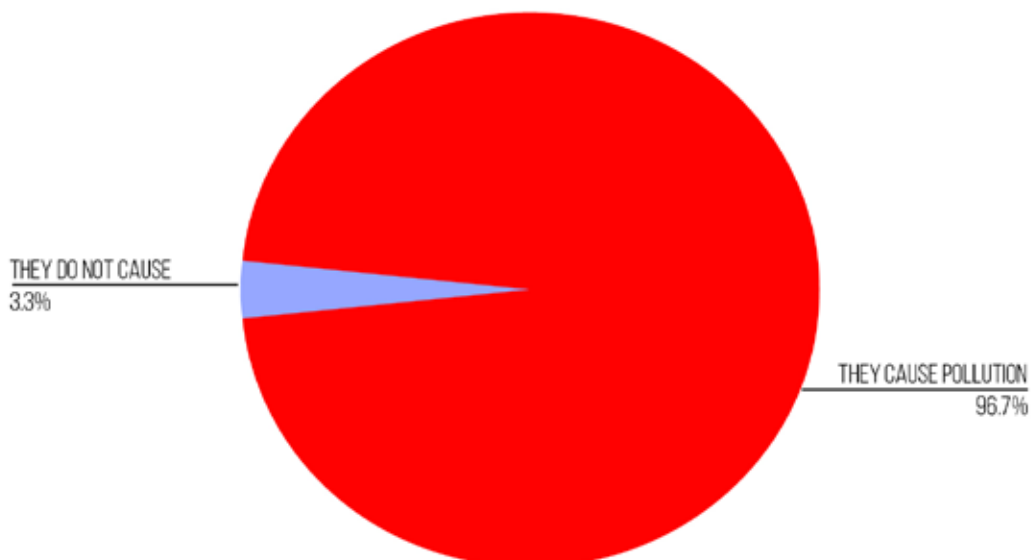


Figure 119: Citizen's perception of plastics causing pollution

5.2.7.3 COMMERCIAL SECTOR

Three hotels, four restaurants and four academic institutes were visited in Rahim Yar Khan, which are also marked on the map in Figure 120.

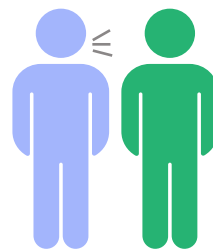
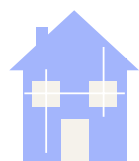


Figure 120: Commercial community in Rahim Yar Khan



3 HOTELS



4 RESTAURANTS



4 INSTITUTIONS

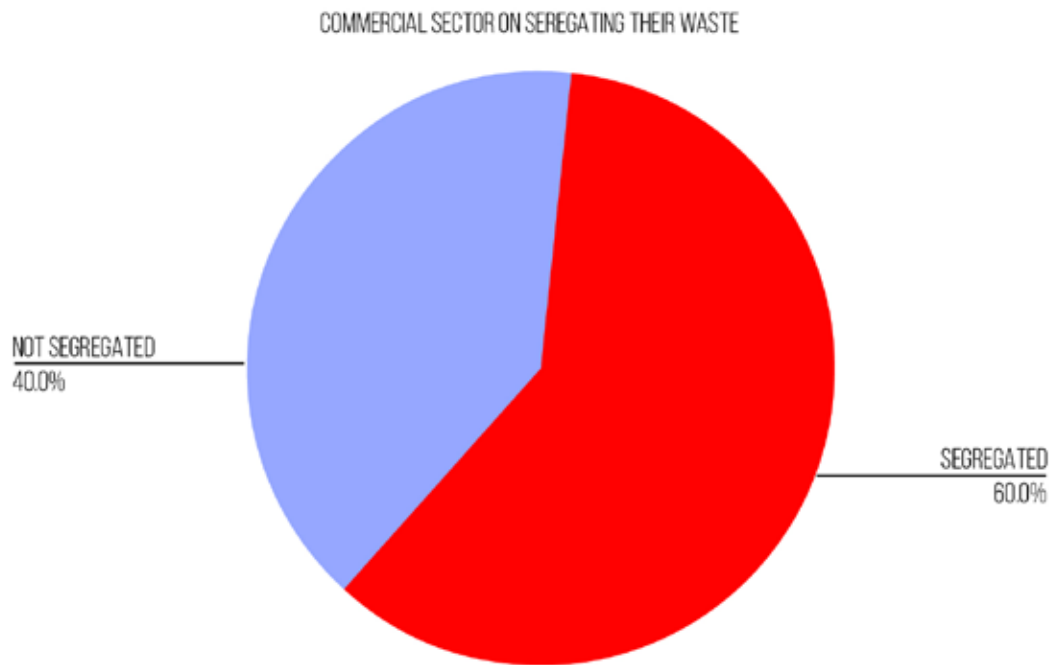


Figure 121: Response of Rahim Yar Khan's commercial sector on segregating waste

According to responses of the commercial sector, it was found that only 60 percent were segregating their waste, while the rest were disposing of mixed waste. This is represented in detail in Figure 121.

According to Figure 122, one hotel in Rahim Yar Khan only consumes an average of 24 kg of PET per month. This is due to the fact that Rahim Yar Khan is not a tourist hotspot and has less visitors staying in hotels. In contrast, an institution produces about 194 kg of PET per month, because each institute has several cafeterias and accommodates numerous students.

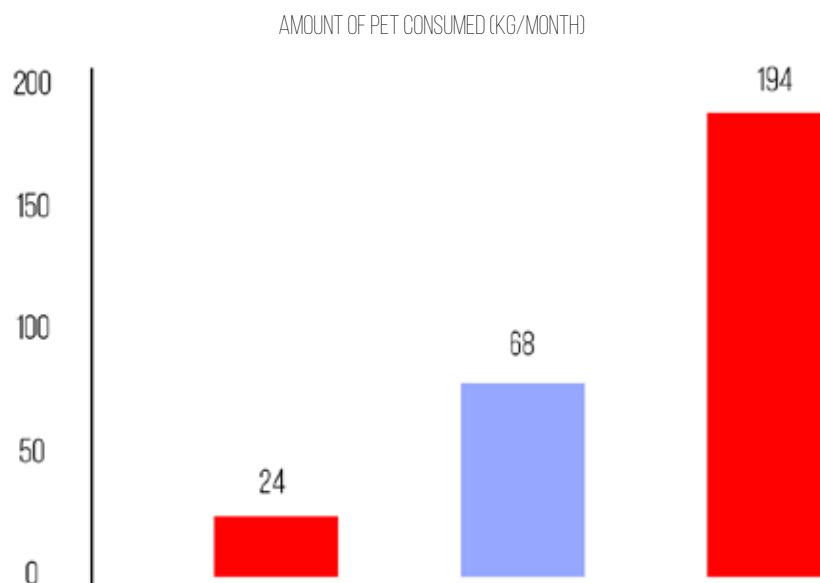


Figure 122: Amount of PET consumed in each commercial sector of Rahim Yar Khan in kg per month

5.2.7.4 SCAVENGERS

A total of 10 scavengers were interviewed in Rahim Yar Khan in different areas of the city, which are marked on the map presented in Figure 123.

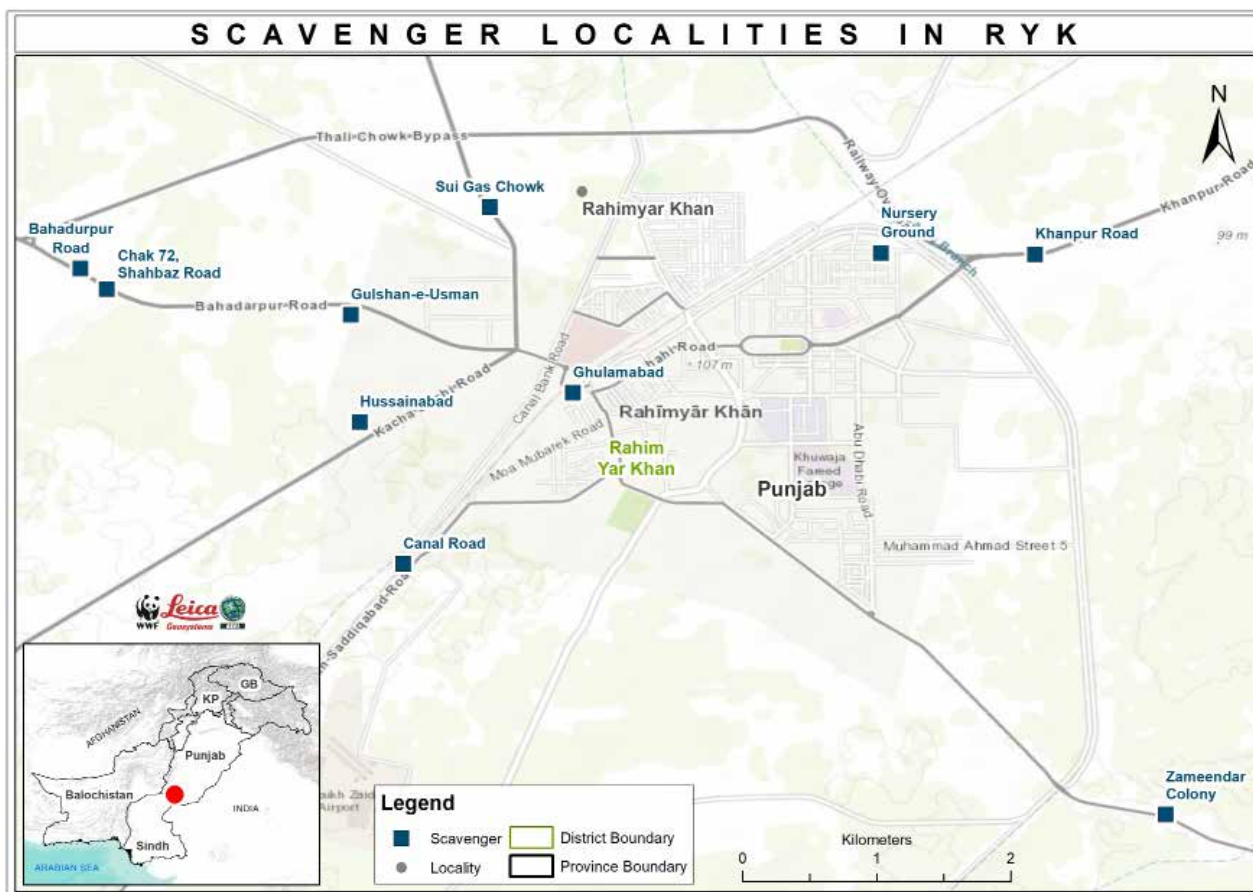
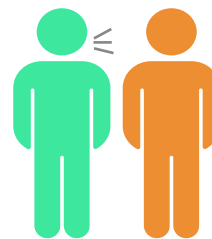


Figure 123: Scavenger localities in Rahim Yar Khan

It was found that PET waste from residential areas is mainly collected by these scavengers. They either employ the means of door-to-door collection or otherwise resort to collection from streets.

Figure 124 represents that 70 percent of scavengers were willing to provide their PET bottles to a recovery facility in return for a higher profit in comparison to what they currently earn.



70 %

scavengers were willing to provide PET bottles to a recovery facility.

WILLINGNESS OF SCAVENGERS TO SUPPLY PET TO A RECOVERY FACILITY

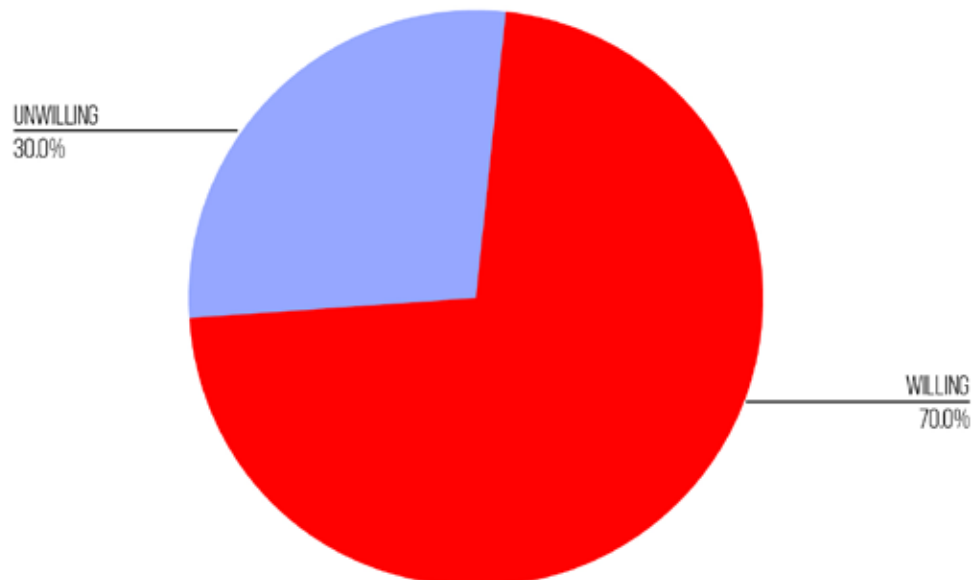


Figure 124: Scavengers' willingness to provide PET to a recovery facility

5.2.7.5 JUNK DEALERS

A total of five junk dealers were interviewed at locations marked on the map in Figure 125.

5 JUNK DEALERS
interviewed in RYK.

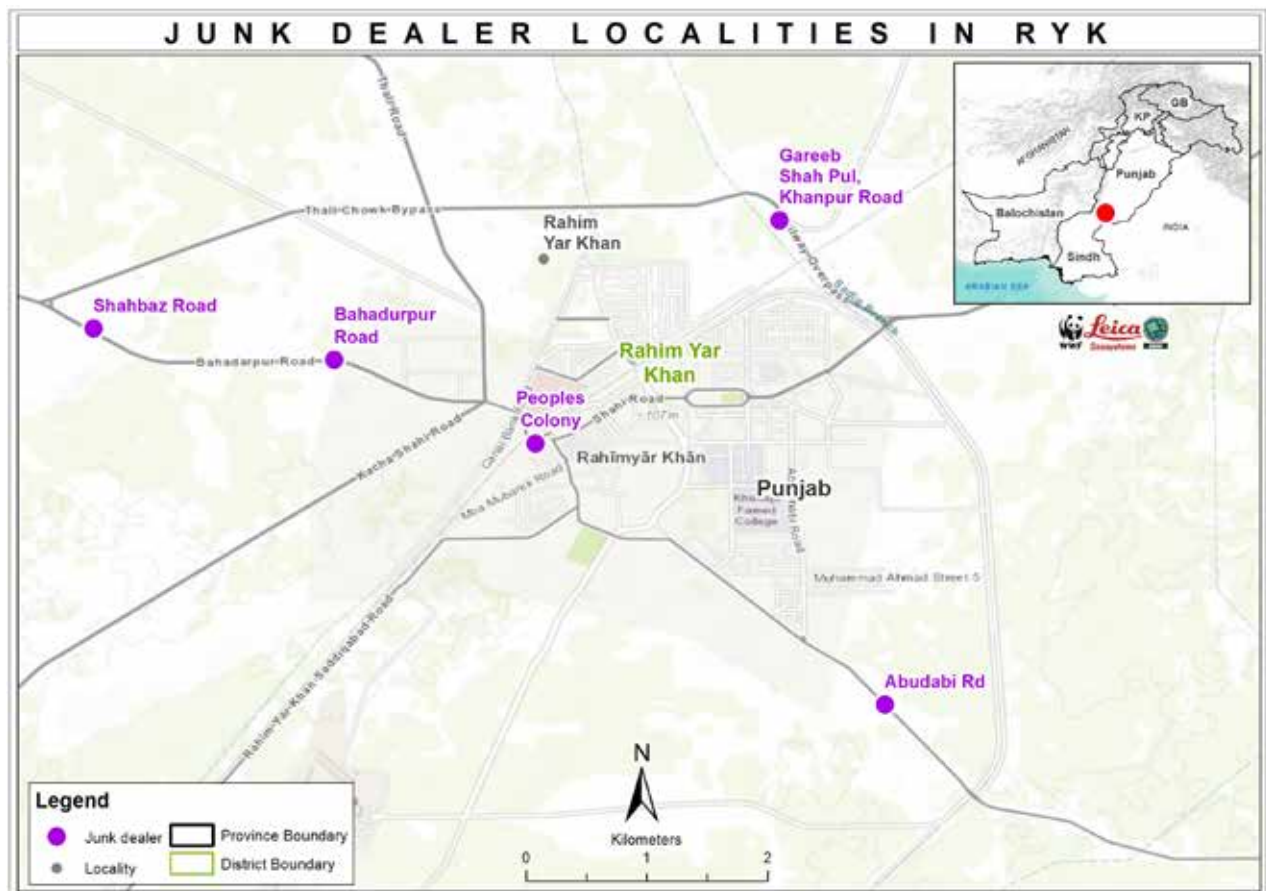


Figure 125: Locations of junk dealers in Rahim Yar Khan

JUNK DEALERS' RESPONSE ON BUYING PET SEPARATELY OR WITH OTHER MIXED WASTE

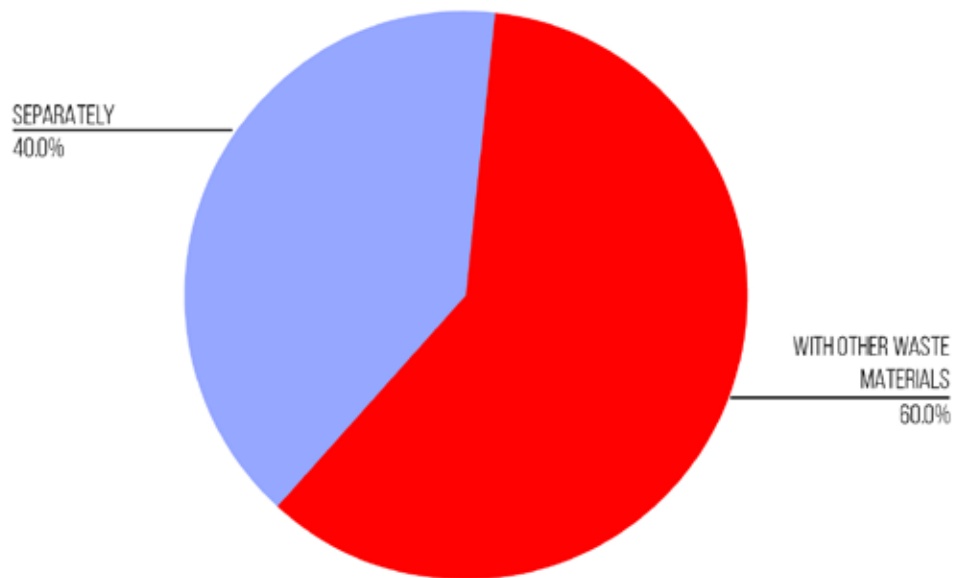


Figure 126: Rahim Yar Khan's junk dealers' response on buying PET separately or with other material

According to Figure 126, waste purchased by the junk dealers from scavengers is usually mixed. A total of 60 percent of junk dealers responded that they purchased PET mixed with other waste materials.

Figure 127 represents that junk dealers who purchase PET with mixed waste do so because it is cheaper and the majority of the times, scavengers only sell it with the mixed waste so they don't have an option.



JUNK DEALERS' REASONS FOR NOT BUYING PET SEPARATELY

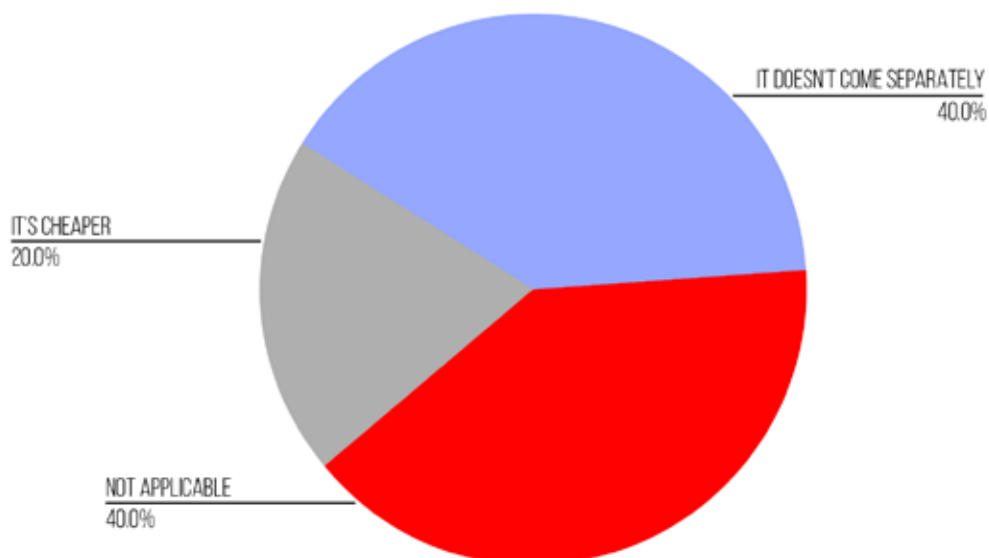


Figure 127: Rahim Yar Khan's junk dealers' response for not buying PET separately

5.2.7.6 RECYCLERS

Two recyclers were tracked down and interviewed in Rahim Yar Khan, one was located near the Ring Road and the other was near Gul Bahar Colony. They were mainly crushing PET and supplying it to textile industries in Lahore and Faisalabad. Their localities are marked in Figure 128.

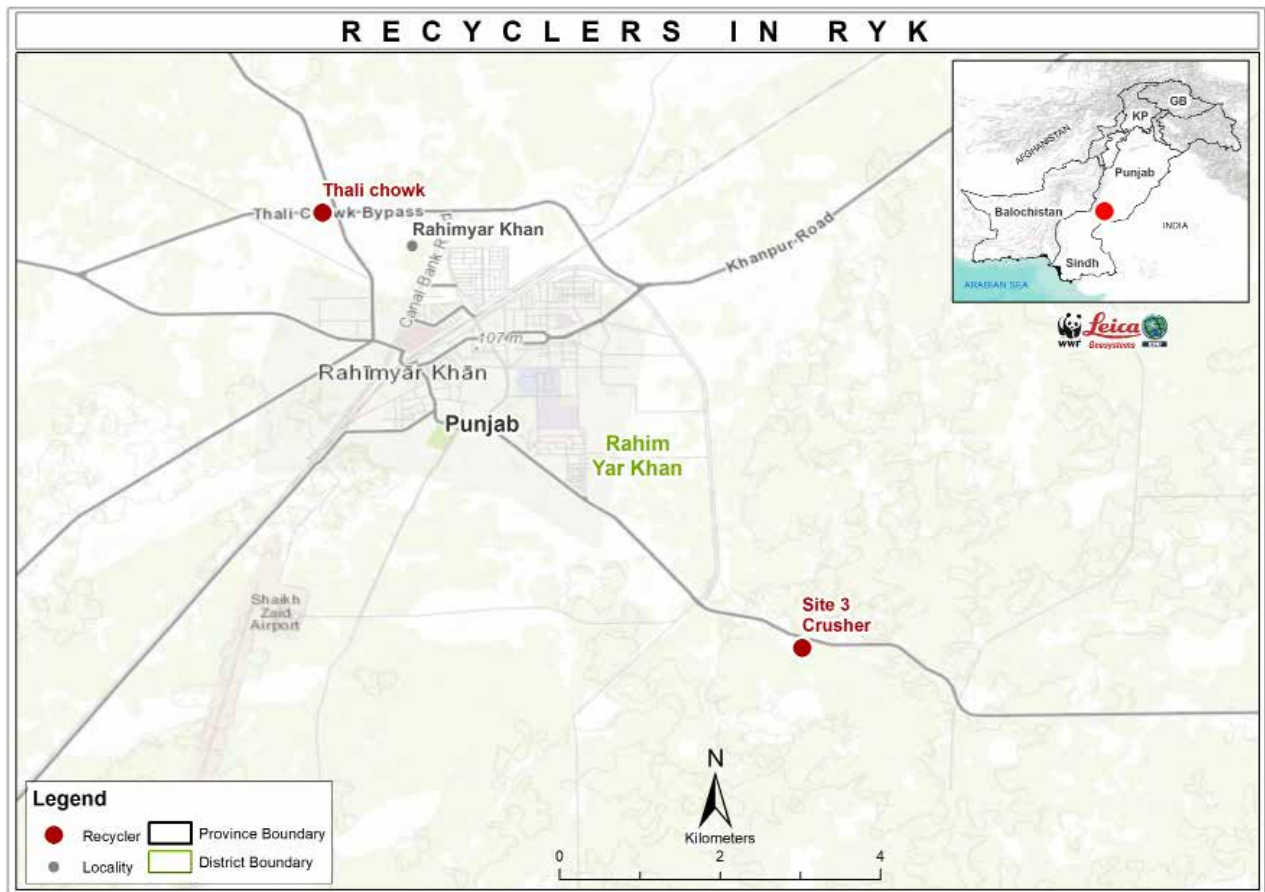
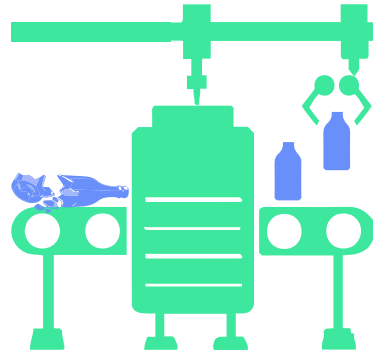


Figure 128: Localities of recyclers in Rahim Yar Khan

Two recyclers were tracked down and interviewed in Rahim Yar Khan, one was located near the Ring Road and the other was near Gul Bahar Colony.

Figure 129 and 130 shows the process of washing and packing the crushed PET bottle flakes.





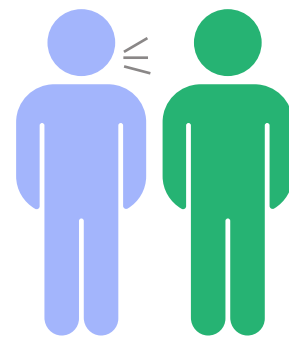
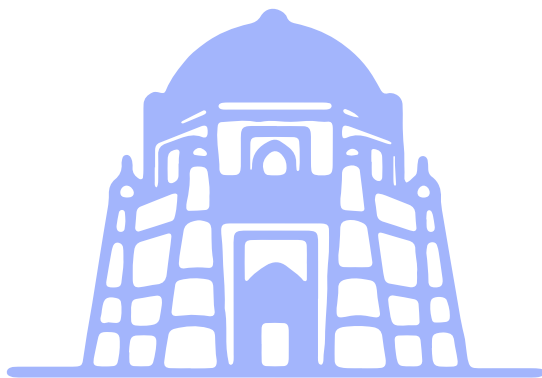
Figure 129: Flakes of crushed PET bottles, Rahim Yar Khan



Figure 130: Flakes of crushed PET bottles being washed, Rahim Yar Khan

5.2.8 MULTAN

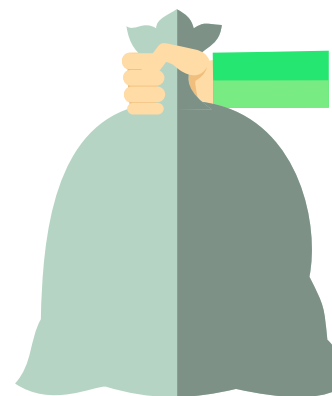
Visits to Multan were conducted in April and May 2019 and around 717 stakeholders from households, the commercial sector and the PET supply chain were interviewed.



717 stakeholders were interviewed

5.2.8.1 WASTE MANAGEMENT COMPANY

Multan Waste Management Company is a recently established public sector entity managing waste in the city. Its collection efficiency is 60 percent, and like other waste management companies, it does not segregate or recycle waste because of financial constraints. Despite this, representatives stated that less than one percent of PET waste is found in collected waste and 100 percent of PET is recycled while nothing goes to dumpsites. They were also aware that plastic causes pollution on land and in water.



100 percent of PET is recycled and nothing goes to the dumpsites.

5.2.8.2 HOUSEHOLDS

Almost 690 household individuals were interviewed and survey questionnaires were filled out. The locations of these households are marked on the map in Figure 131.



690 households were interviewed

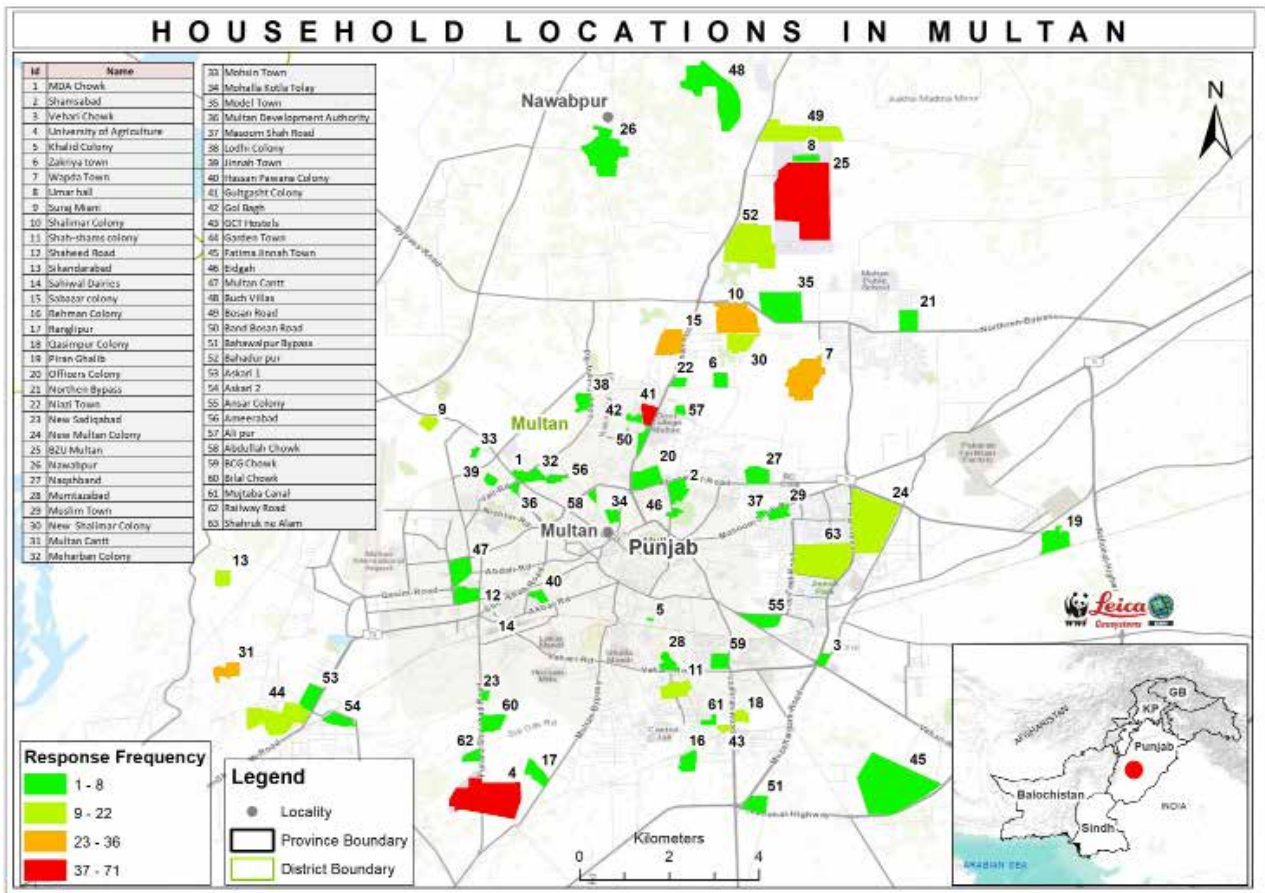


Figure 131: Localities of households, Multan

According to Figure 132, the major component in Multan’s household plastic waste were plastic bags, whereas only 35 percent claimed that PET bottles are mostly disposed of in their homes as compared to other plastic items.



35 % of households claimed PET bottles to be the most disposed item in their homes.



Plastic bags are the major component of plastic waste.

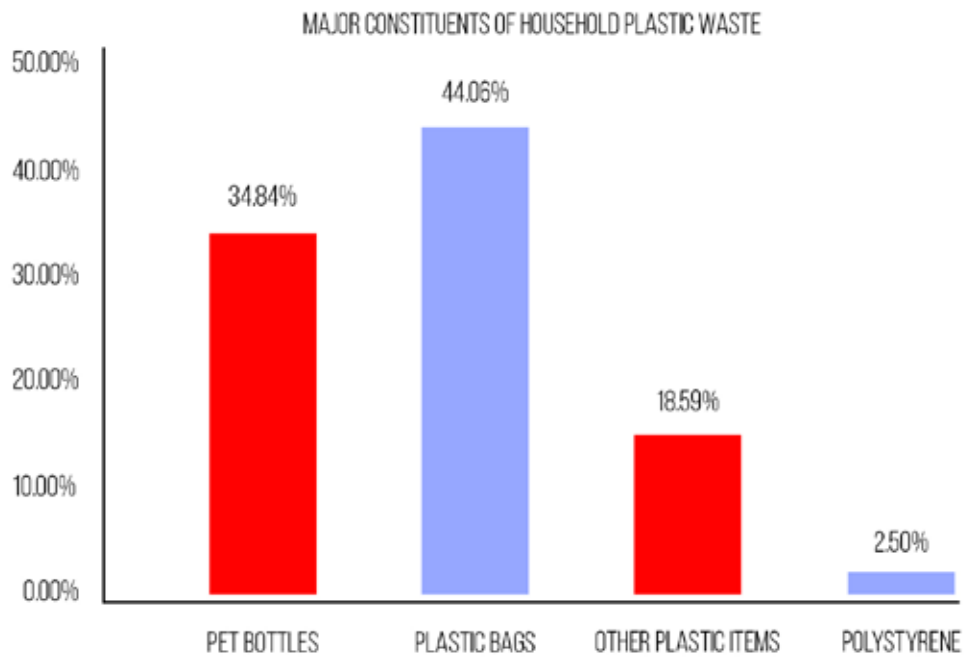


Figure 132: Major constituents of plastic waste in Multan's households

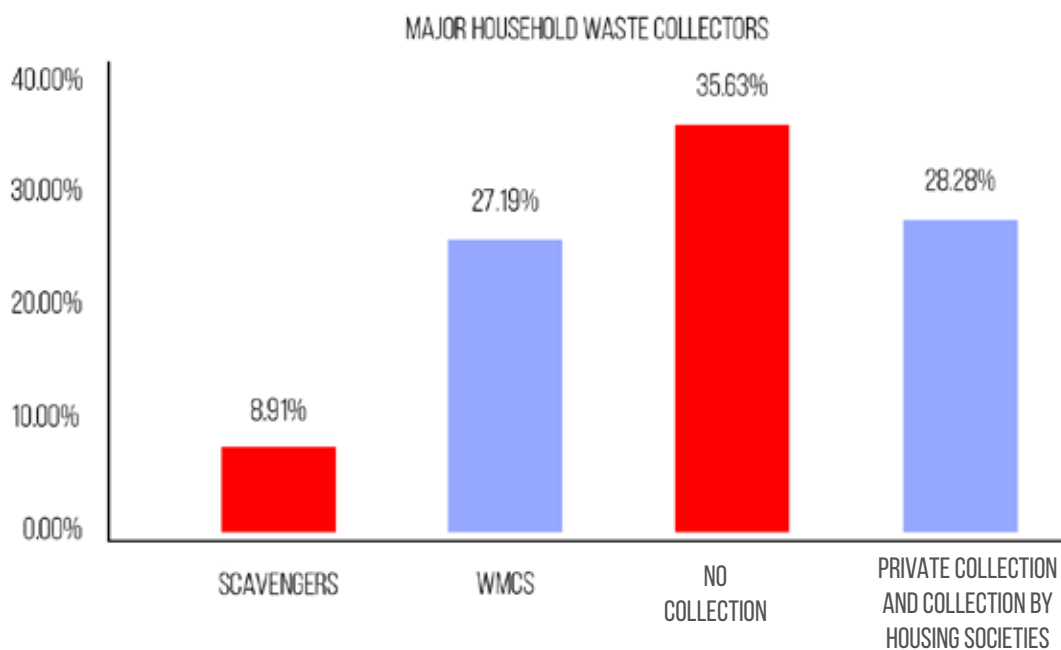


Figure 133: Major waste collectors in Multan's households

According to Figure 133, 36 percent of respondents stated that their waste remains uncollected, while 28 percent claimed it is picked up by private collectors and 27 percent stated that their waste is collected by MWMC.

36 %

claimed their waste remains uncollected.

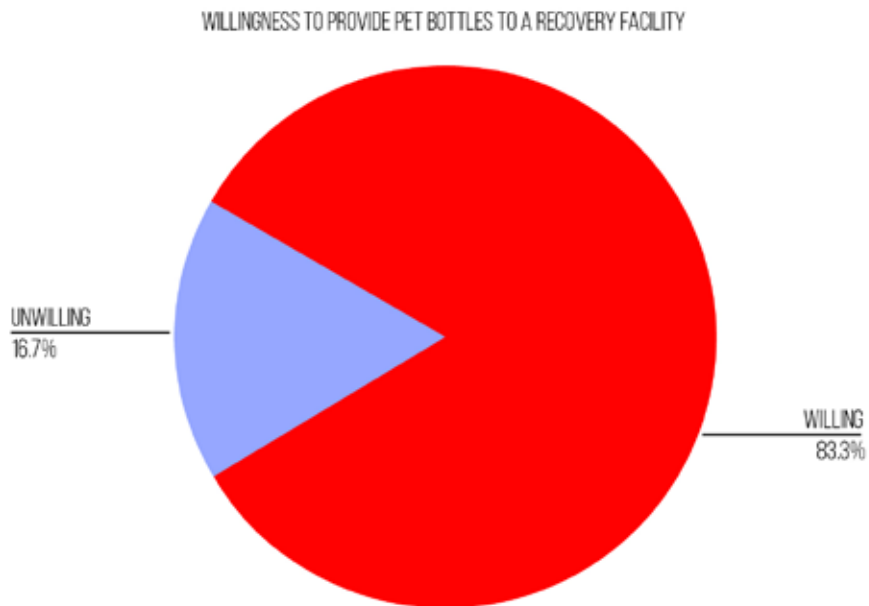


Figure 134: Willingness to provide PET to a recovery facility

Figure 134 states that almost 83 percent of citizens in Multan were willing to provide their PET waste to a recovery facility.

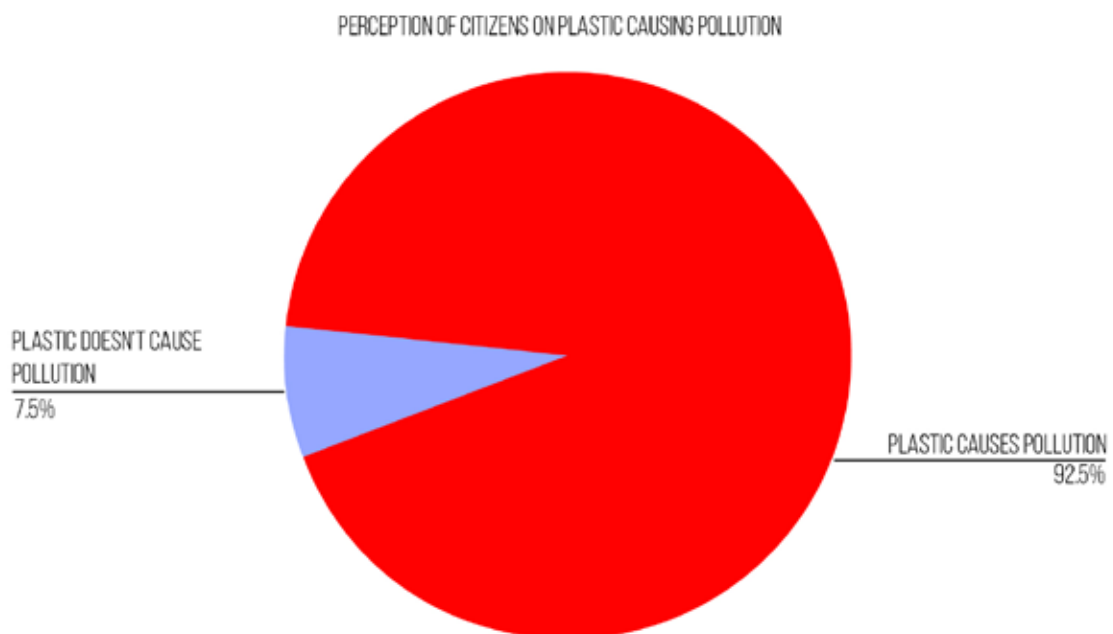


Figure 135: Perception of Multan's individuals on plastic pollution

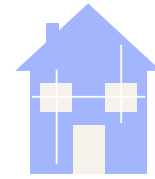
Figure 135 states that approximately 93 percent of respondents were aware that poor disposal of plastics leads to land and water pollution.

93 %

respondents were aware that plastic disposal leads to land and water pollution.

5.2.8.3 COMMERCIAL SECTOR

The commercial community in Multan was quite accommodating and filled out the survey questionnaires promptly.



5 HOTELS

The answers of each entity under the commercial sector are presented below and the areas where these questionnaires were filled are also marked in Figure 136.



15 RESTAURANTS



10 INSTITUTIONS



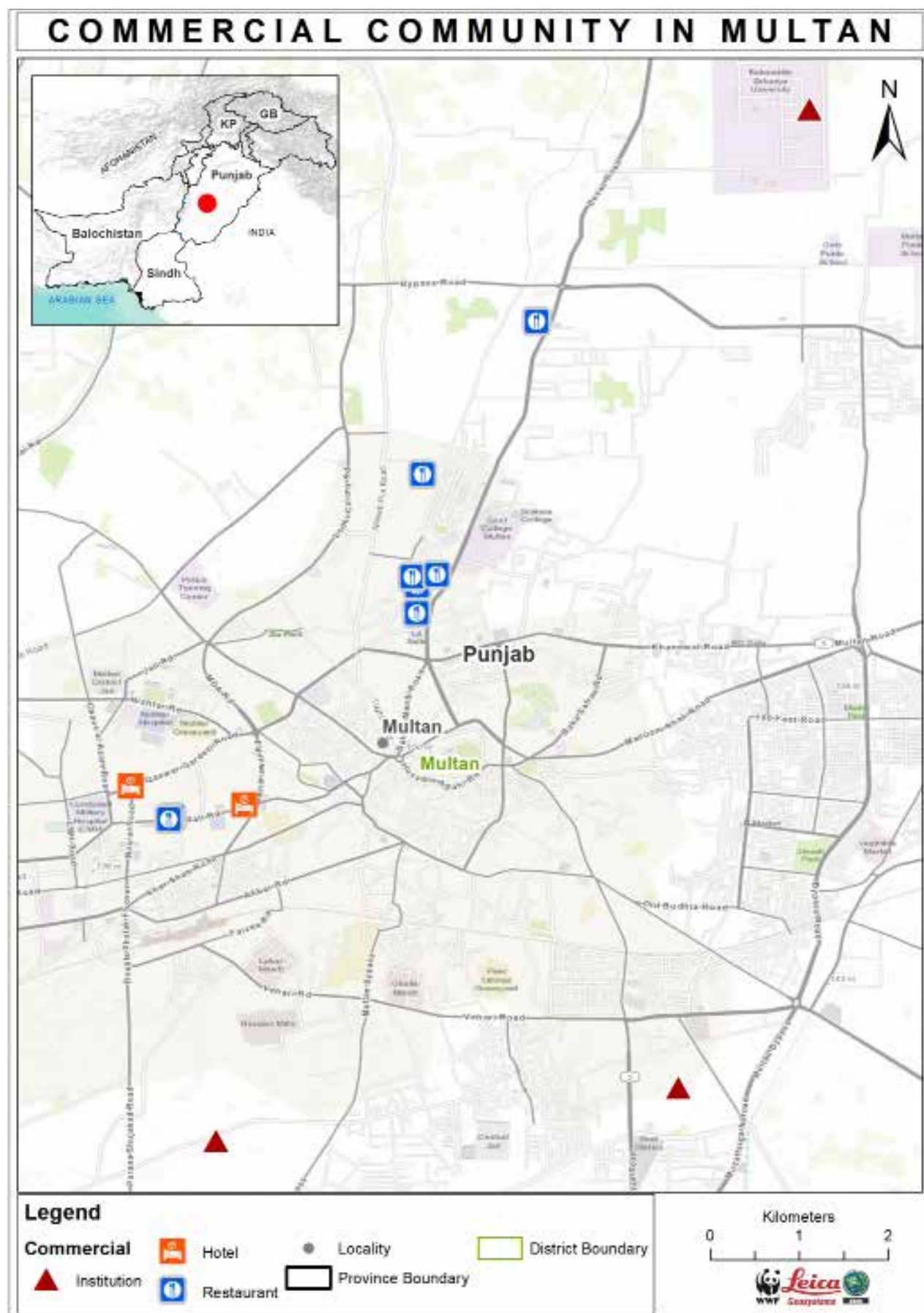


Figure 136: Commercial community in Multan

COMMERCIAL SECTOR'S RESPONSE ON SEGREGATING THEIR WASTE

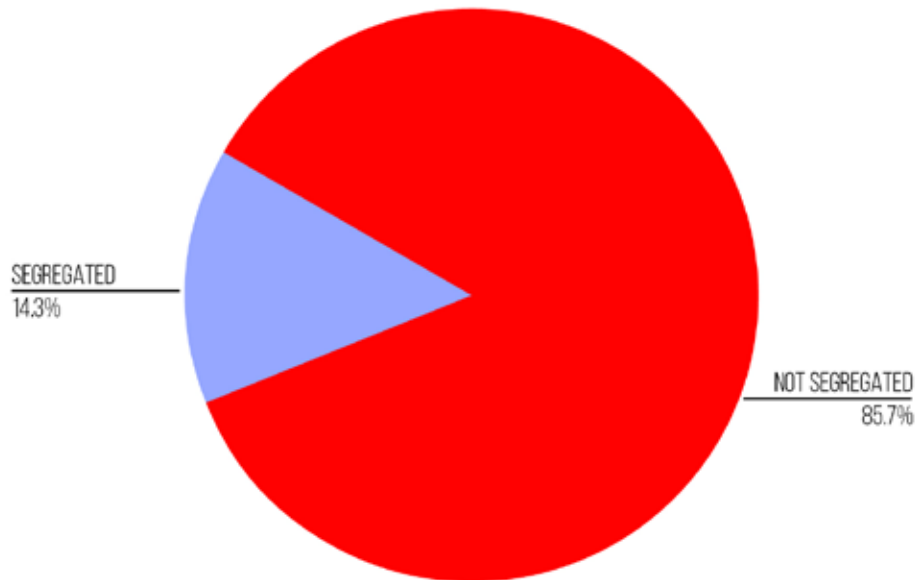


Figure 137: Response of Multan's commercial sector on segregating their waste

Figure 137 represents that 86 percent of the commercial sector interviewed were not segregating their waste into recyclables and non-recyclables, while only 14 percent were segregating waste.

According to Figure 138, the major PET waste generated in the commercial sector is represented by hotels that amounts to an average of 123 kg of bottles per month per hotel, while the PET usage of an educational institute is 83 kg and a restaurant generates an average of 34 kg of PET waste monthly.

AVERAGE PET WASTE GENERATION (KG/MONTH)

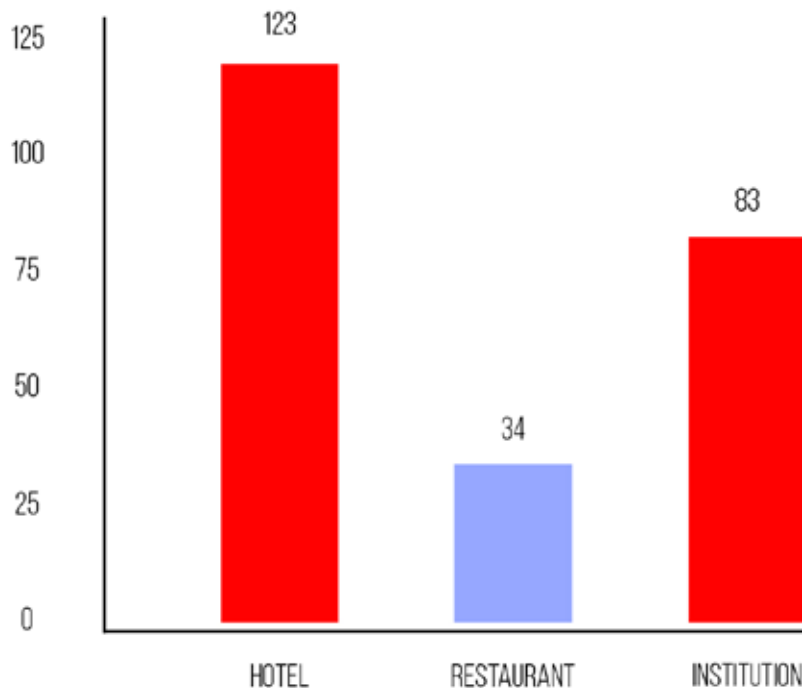


Figure 138: Average PET waste generated in each commercial sector of Multan

5.2.8.4 SCAVENGERS

A total of 19 scavengers were interviewed at different locations in the city, which are marked on the map in Figure 139. In Multan, waste pickers normally go around on donkey carts or carry sacks on their backs to collect sellable waste from residences and open dumpsites.

19 scavengers were interviewed at different locations in the city

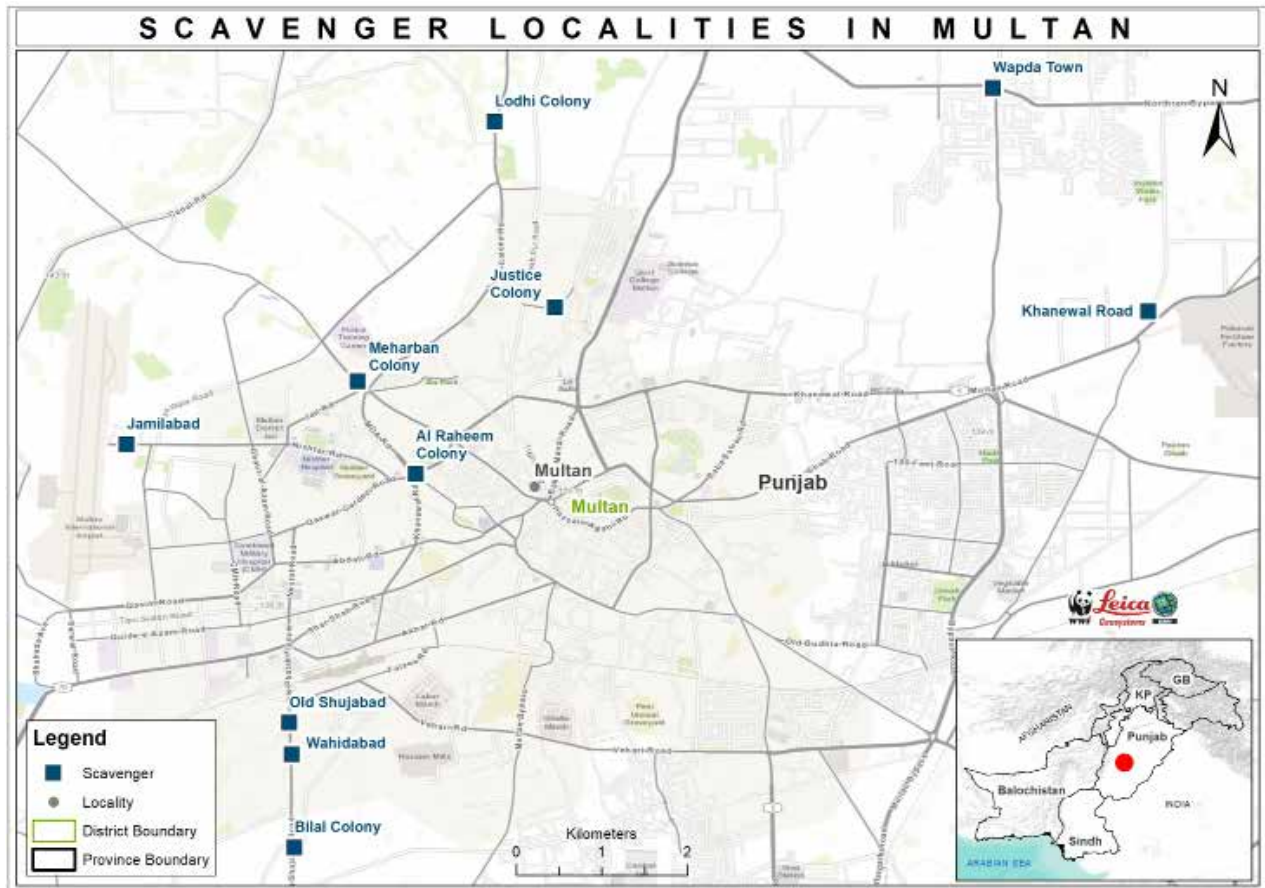


Figure 139: Localities of scavengers in Multan

Figure 140 depicts that 58 percent of scavengers collected PET from residential areas, whereas, 37 percent collected PET from open dumps.

58 %

PET bottles were found in residential areas.



37 %

PET bottles were found in open dumps.

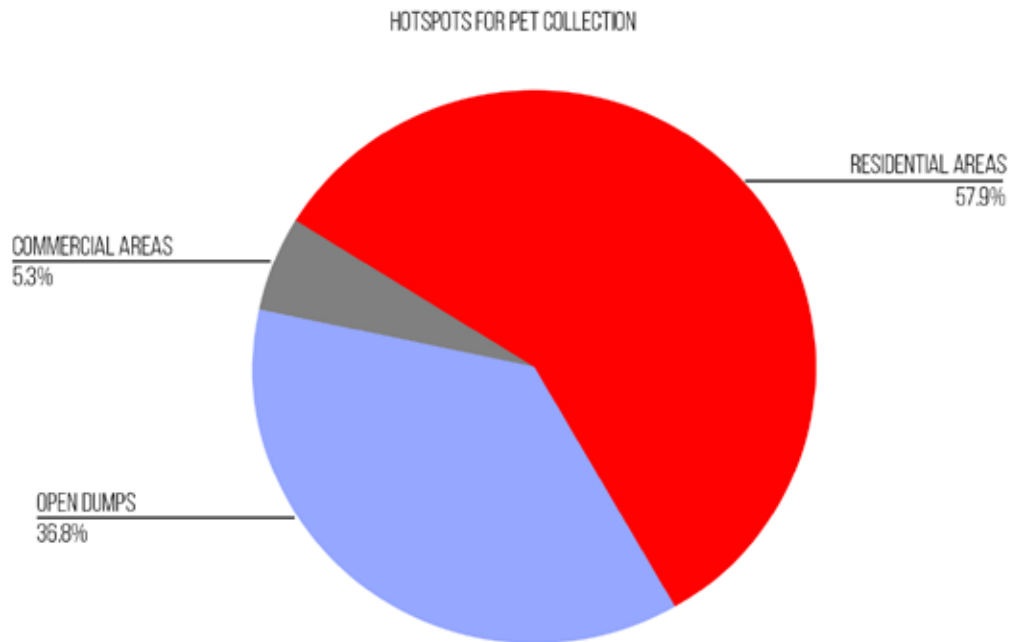


Figure 140: Scavenger hotspots in Multan for PET collection

5.2.8.5 JUNK DEALERS

Junk dealers in Multan were usually provided with PET waste at their facilities by the scavengers at a price that ranged from PKR 15 per kg

to PKR 30 per kg. Similarly, they sold it to the recyclers/crushers, while keeping a profit of PKR 10. A total of 10 junk dealers were interviewed in Multan and their locations are mapped in Figure 141.

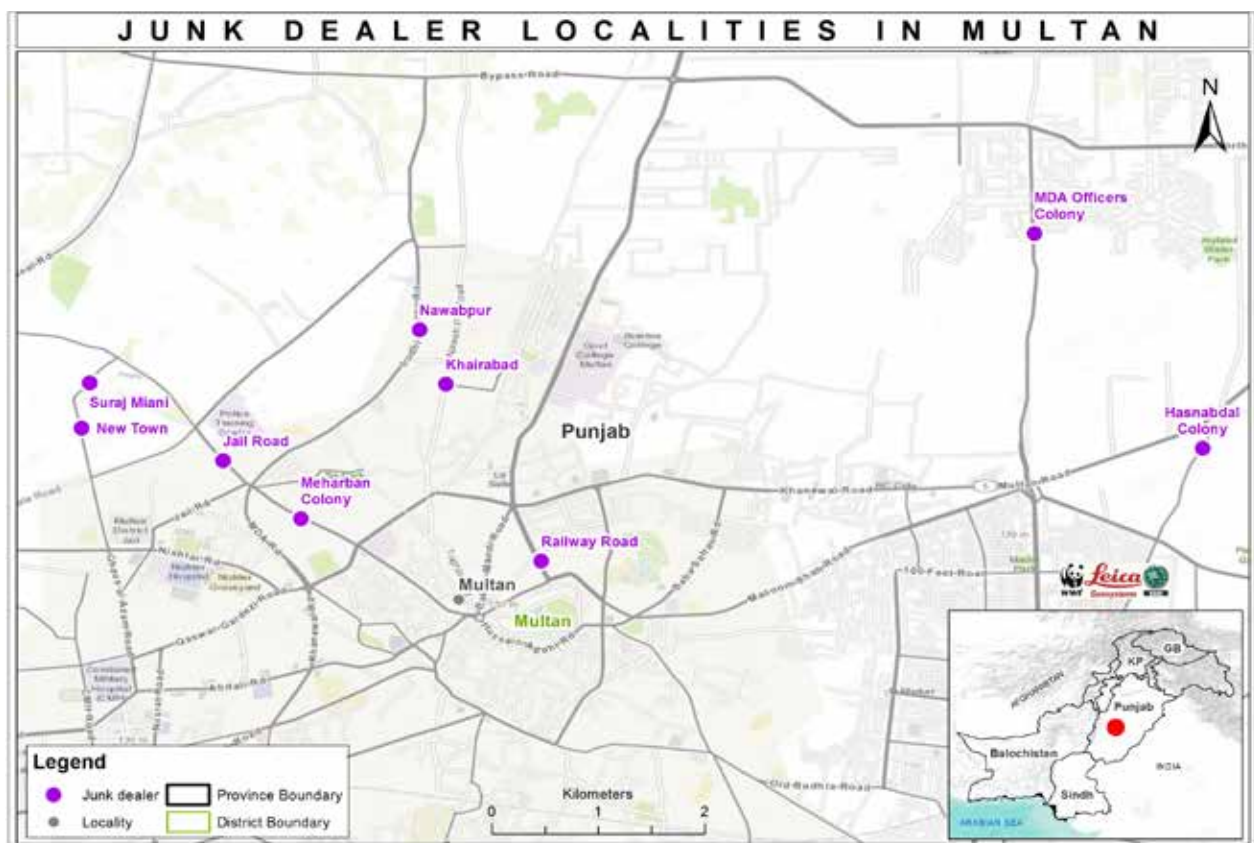


Figure 141: Localities of junk dealers in Multan

JUNK DEALERS' RESPONSE ON BUYING PET WASTE SEPARATELY

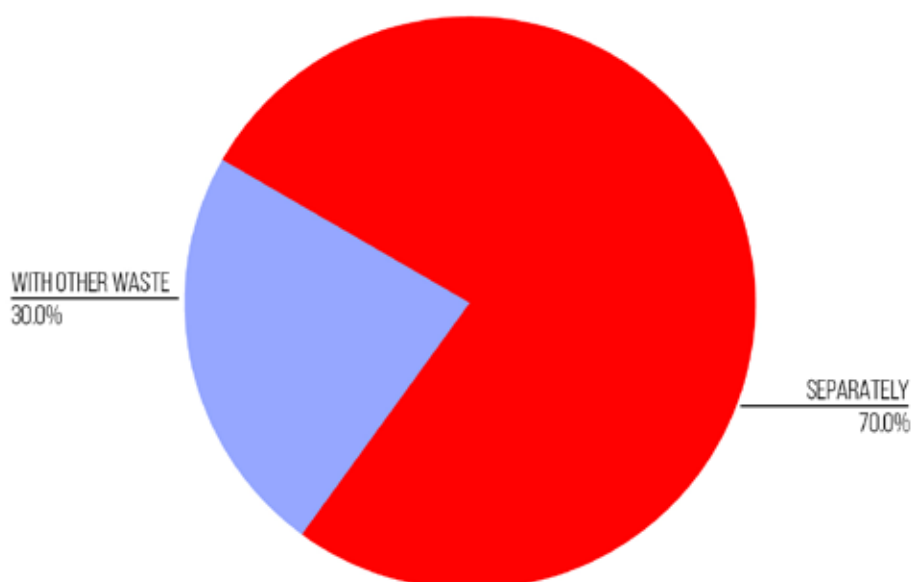


Figure 142: Multan's junk dealer's response to buying PET waste separately

According to Figure 142, 70 percent of junk dealers purchase PET separately from other sellable waste materials, while 30 percent purchase it with mixed waste.

According to Figure 143, 30 percent of respondents buy PET with other waste materials as it is cheaper to do so, while 70 percent buy PET separately from other waste materials.

70 %

junk dealers purchased PET separately from other sellable materials.

30 %

respondents purchased PET with other materials.

JUNK DEALERS' REASONS FOR PURCHASING PET WITH OTHER WASTE MATERIALS

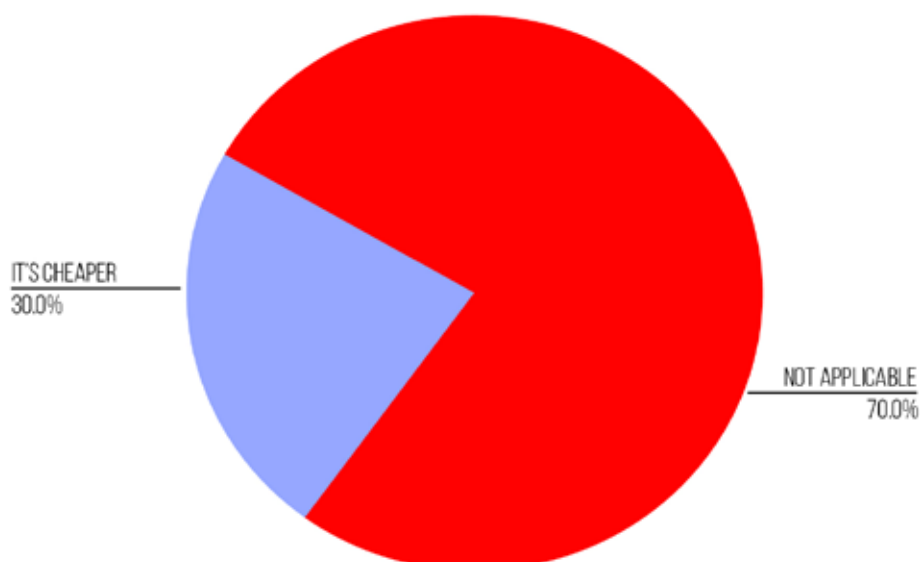


Figure 143: Multan's junk dealers' opinion regarding the procurement of PET with other waste material

5.2.8.6 RECYCLERS

Two recyclers were visited in Multan and their locations have been mapped in Figure 144. Both had crushing units where PET waste was converted into small flakes. Later, they were sent to other cities for further processing and conversion into useful products. They were of the view that 100 percent PET is recycled and nothing goes to dumpsites. Heaps of PET bottle at one of the recycler's facility can be seen in Figure 145.



Figure 145: Heaps of PET bottles at a recycler's facility in Multan

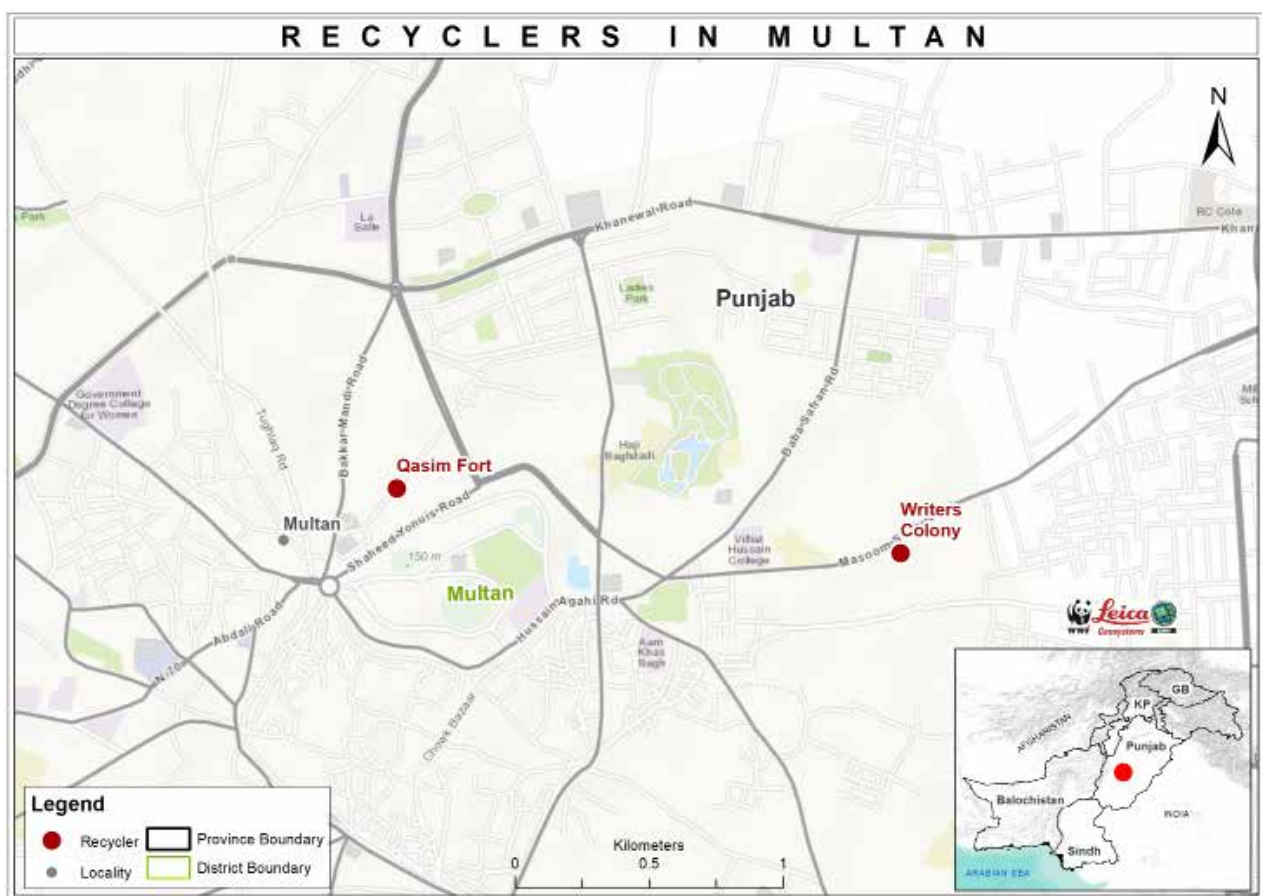
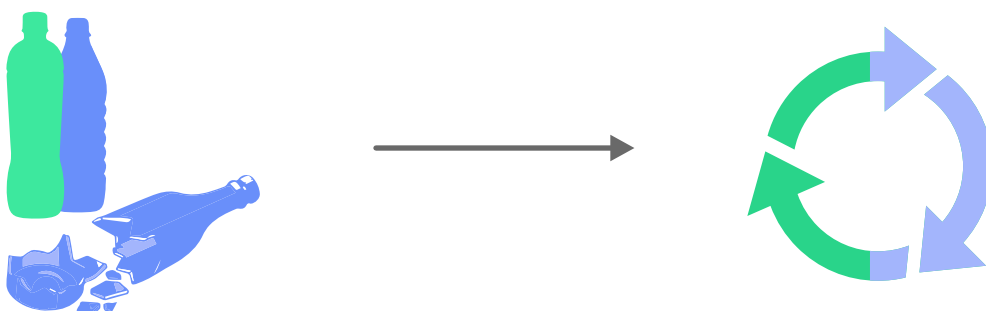


Figure 144: Localities of recyclers in Multan



5.2.9 GUJRANWALA

Gujranwala visits were conducted in April 2019 and around 437 stakeholders from households, commercial sector and the PET supply chain were interviewed.

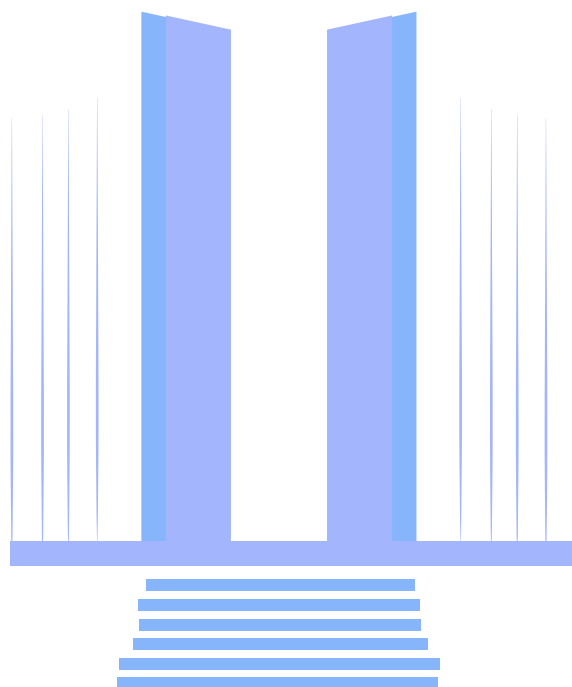


Figure 146: Dumping site of Gujranwala

5.2.9.1 WASTE MANAGEMENT COMPANIES

Gujranwala Waste Management Company (GWMC) collects around 1,100 tonnes of waste from the city and claims to have an efficiency of 70 percent. According to them, the reasons preventing them from segregating waste is the lack of transportation and technology.

Furthermore, representatives stated that even though more than 15 percent of PET is found in collected waste, this percentage decreases drastically when the waste reaches the dumpsite as scavengers and waste pickers scour through the dumped waste and gather all PET bottles. Furthermore, 80 percent of PET waste is recycled, while unrecycled PET is openly dumped in water bodies and on land.

Figure 146 and 147 show a designated dumping site of GWMC and trucks ready to unload collected waste.



Figure 147: Trucks of GWMC at dumpsite, Gujranwala

5.2.9.2 HOUSEHOLDS

Questionnaires were filled by 440 households on waste disposal practices. Responses were recorded and are presented in the form of pie and bar charts. In order to get a fair representation of the population, residential areas all over Gujranwala were approached; their localities are marked on the map in Figure 148.

440 HOUSEHOLDS

filled questionnaires on waste disposal practices.

HOUSEHOLD LOCATIONS IN GUJRANWALA

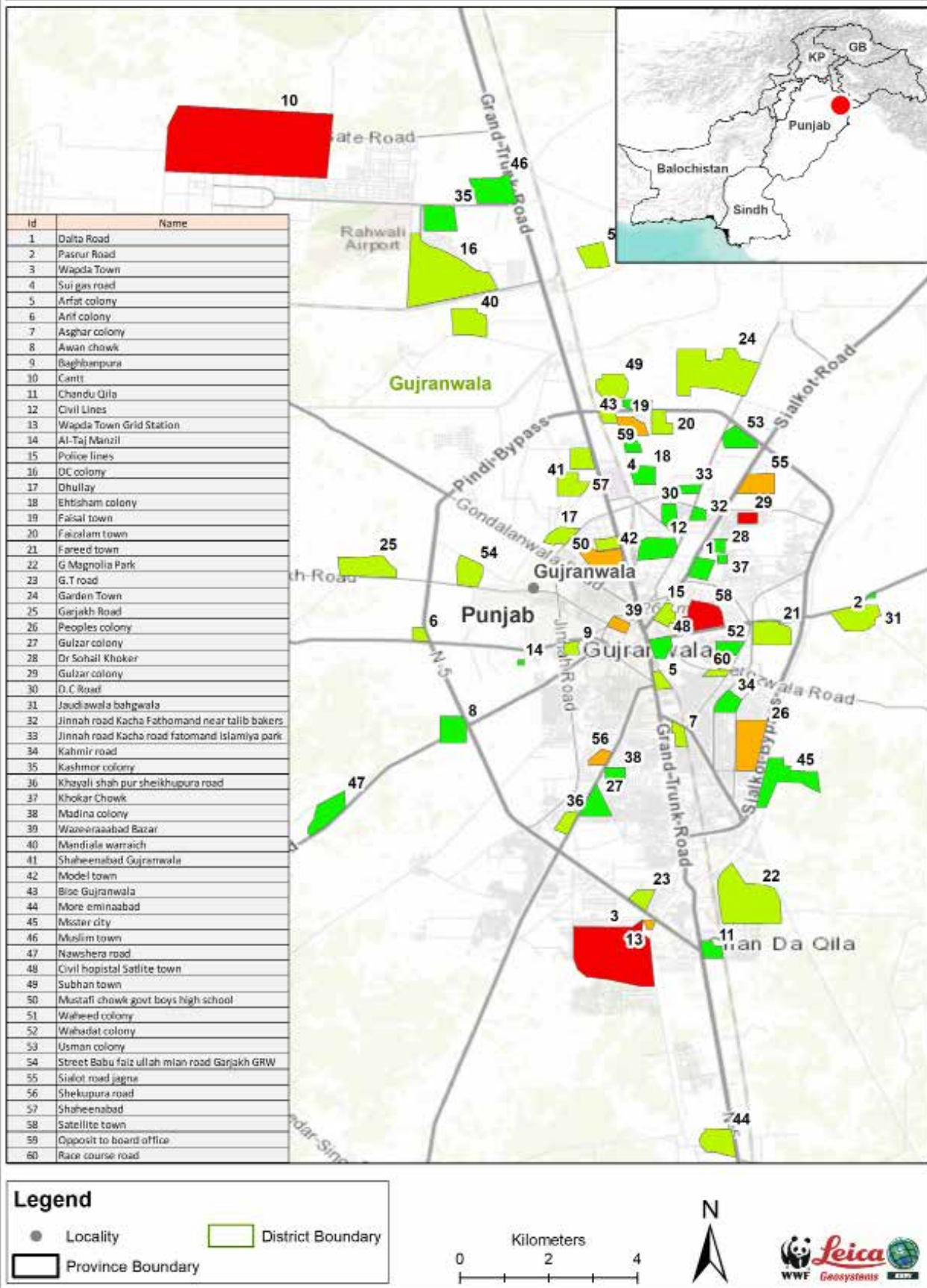


Figure 148: Localities of households, Gujranwala

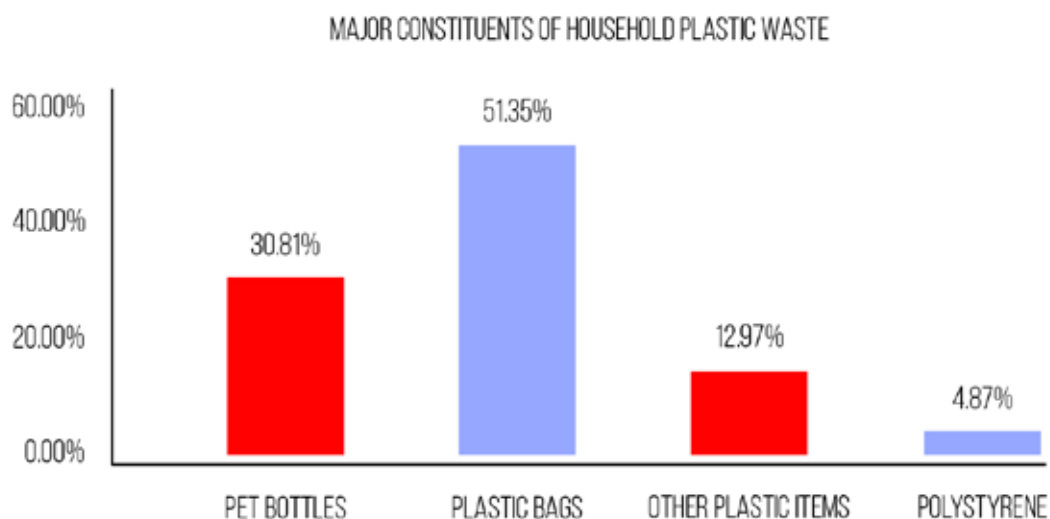


Figure 149: Major constituents of plastic waste in Gujranwala

According to Figure 149, 51 percent of respondents stated that a major component of plastic waste consists of plastic bags, whereas 31 percent claimed that PET bottles are the most disposed item in their household.

The pie chart in Figure 150 shows that 40 percent of households had waste management company collectors pick up their waste, while the rest had private waste collectors. In contrast, 29 percent of respondents stated that their waste is not collected because no public or private waste management company operates in their area.

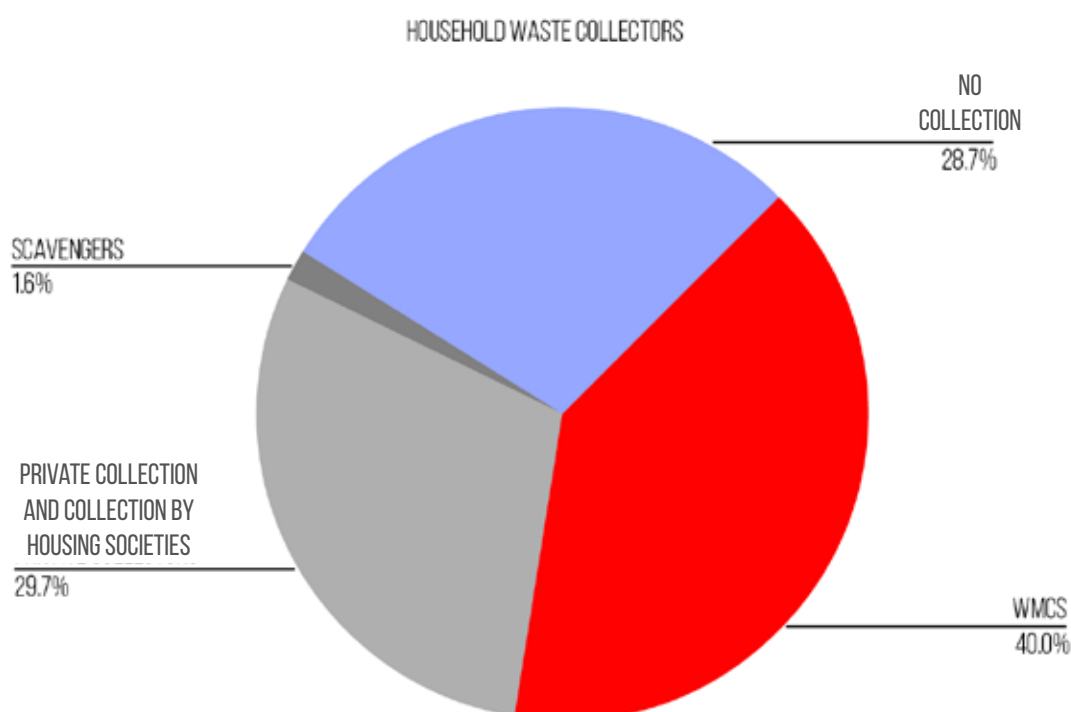


Figure 150: Major waste collectors in Gujranwala's households

CITIZENS' WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY

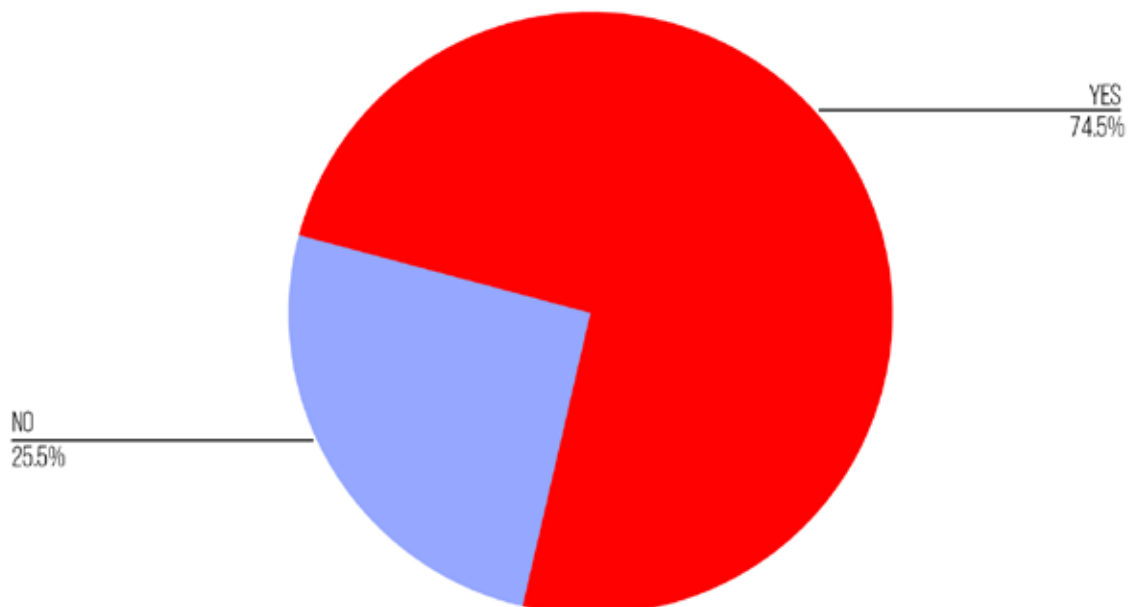


Figure 151: Willingness of individuals of Gujranwala to provide PET to a recovery facility

According to Figure 151, 75 percent of the citizens of Gujranwala were willing to provide their PET to a recovery facility, while the rest were unwilling to do so because they did not show concern about plastic pollution.

According to Figure 152, 92 percent of participants believe that plastic was causing both water and land pollution.

PERCEPTION OF CITIZENS ON PLASTIC CAUSING POLLUTION

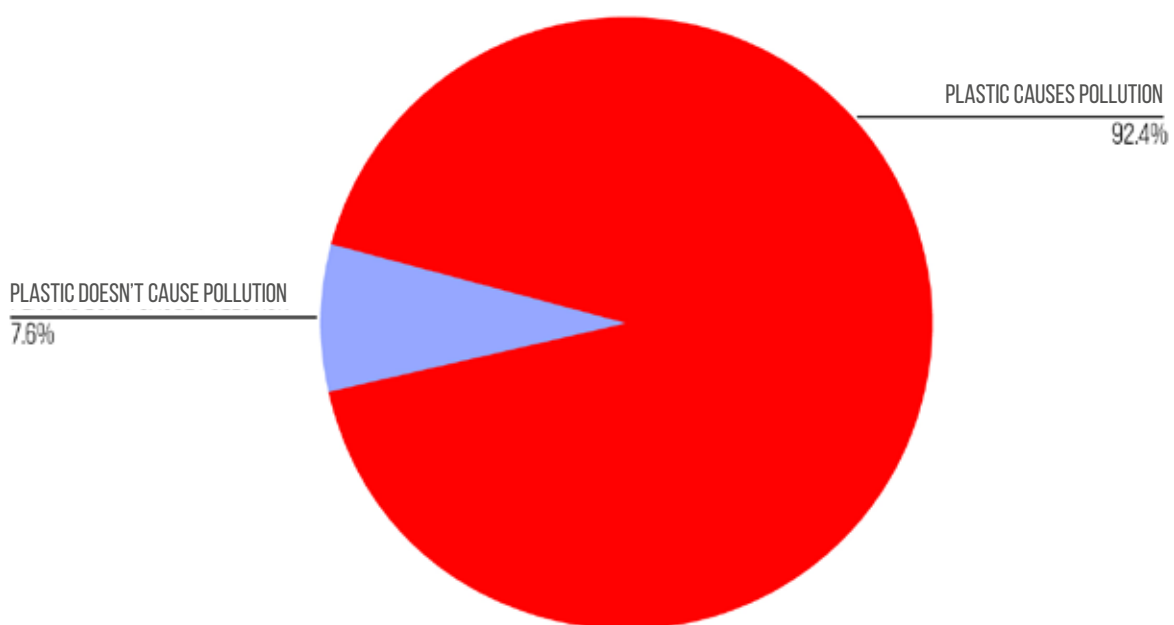


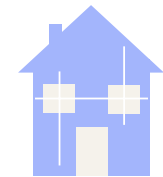
Figure 152: Perception of Gujranwala's citizens on plastic pollution

5.2.9.3 COMMERCIAL SECTOR

Three hotels, five restaurants and three educational institutions were visited in Gujranwala from 23 to 25 April 2019 to gather information on the current PET usage patterns in the selected commercial locations, assessing awareness levels on plastic pollution and identifying the willingness to provide PET bottles to a recovery facility. The selected sites are represented on the map in Figure 153.



Information was gathered on current PET usage patterns.



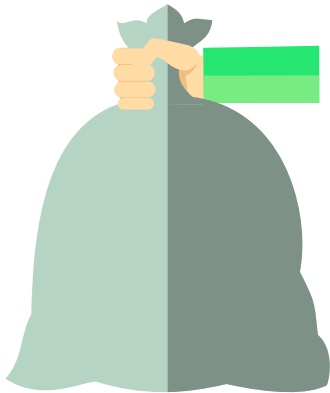
3 HOTELS



5 RESTAURANTS



3 INSTITUTIONS



Awareness level was assessed on providing PET bottles to a recovery facility.



The selected sites are represented in Figure 153.

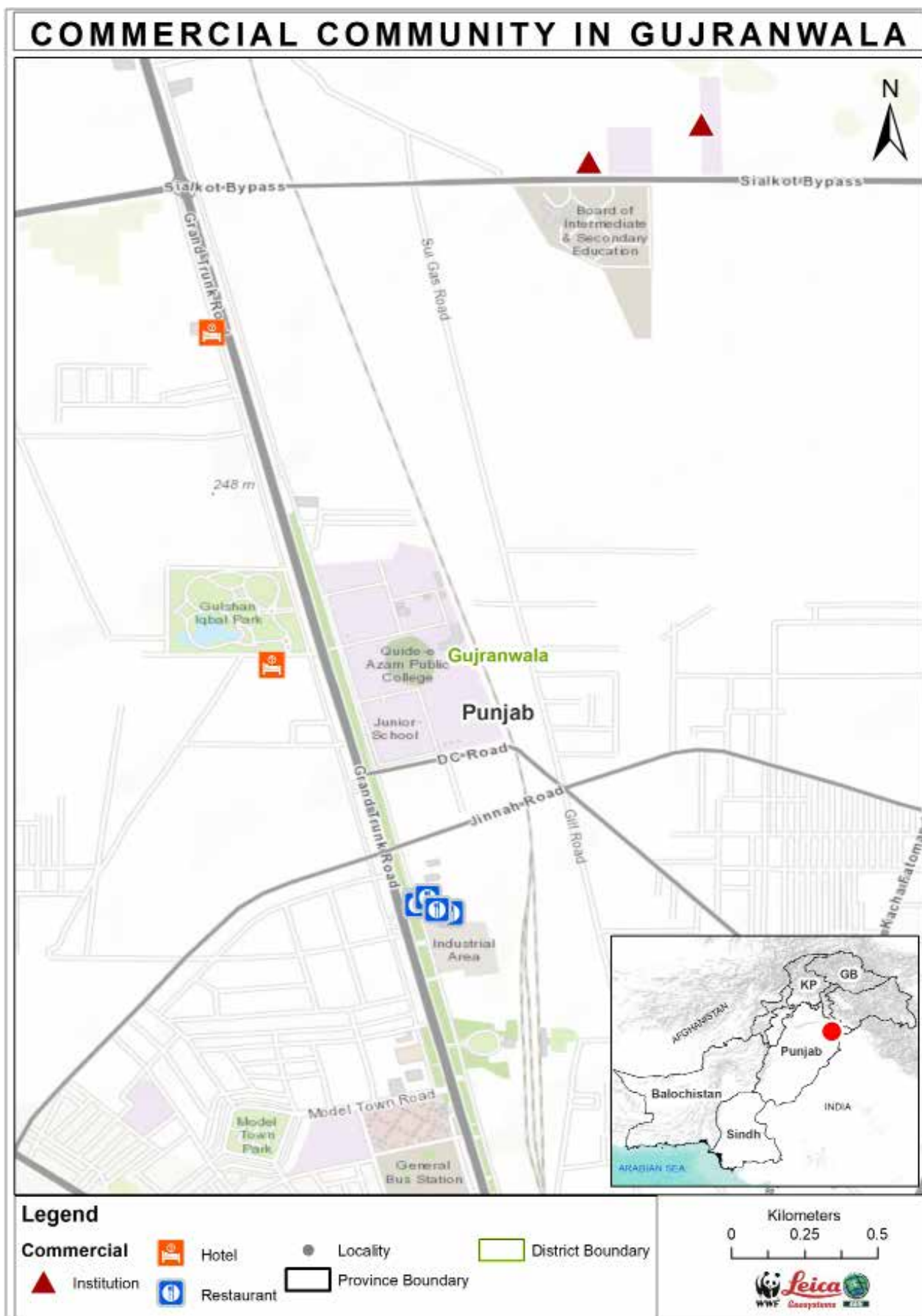


Figure 153: Localities of the commercial sector, Gujranwala

According to Figure 154, 78 percent of the commercial sector including hotels, restaurants and institutes do not segregate their waste.

78 %
of commercial sector were
not segregating their waste.

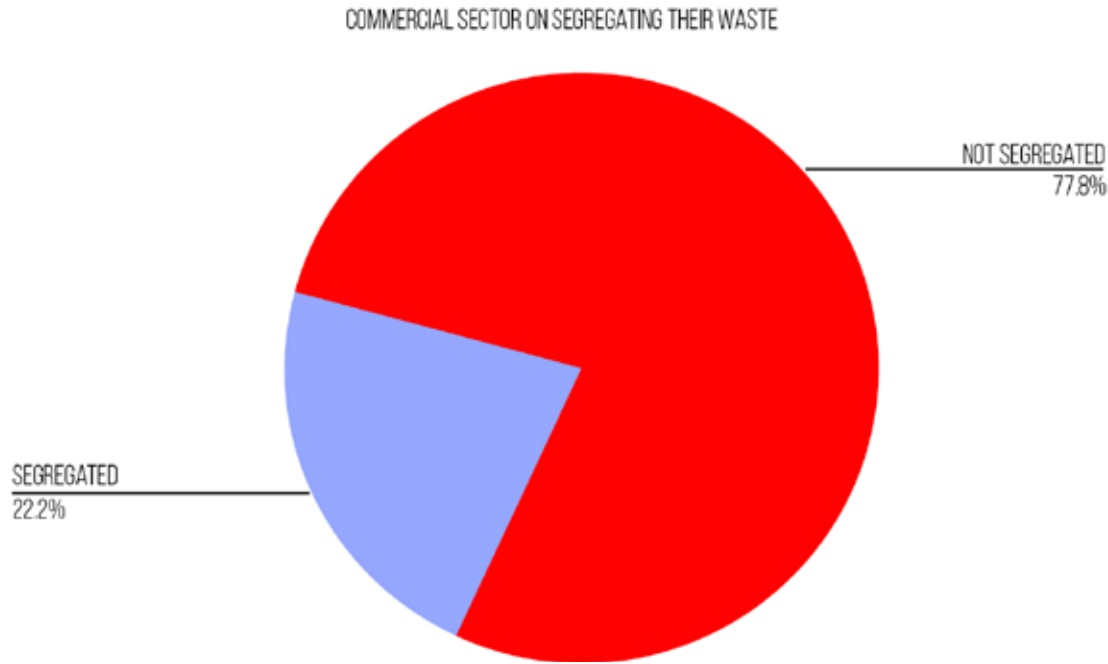
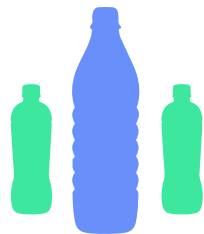


Figure 154: Commercial sector’s responses on segregating their waste

According to Figure 155, the highest consumption of PET bottles is in the institutes of Gujranwala, i.e. almost 54 kg per month of PET bottle waste is produced in one institute. On the other hand, hotels and institutions produce an average of 2 kg of PET waste per month.



On average
54 KG

of PET bottle waste produced
in one institute of Gujranwala.



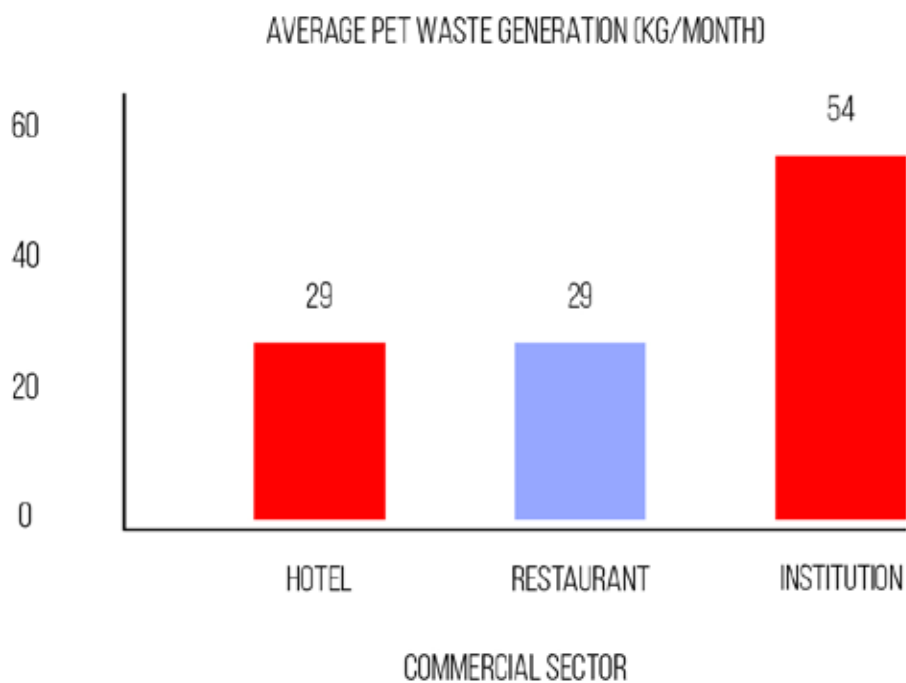
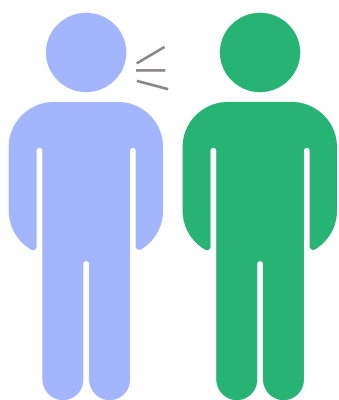


Figure 155: PET bottle consumption in the commercial sector of Gujranwala

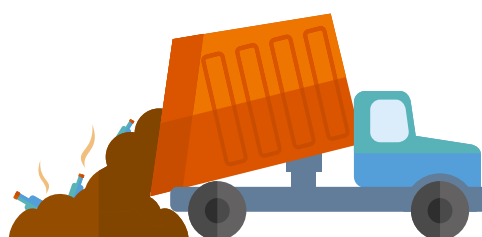
5.2.9.4. SCAVENGERS

A total of 12 scavengers were interviewed in Gujranwala in April 2019, with the help and facilitation of GWMC.

Most scavengers were found at open dumping sites and on roadsides. Their locations can be found in Figure 156.



12 scavengers were interviewed



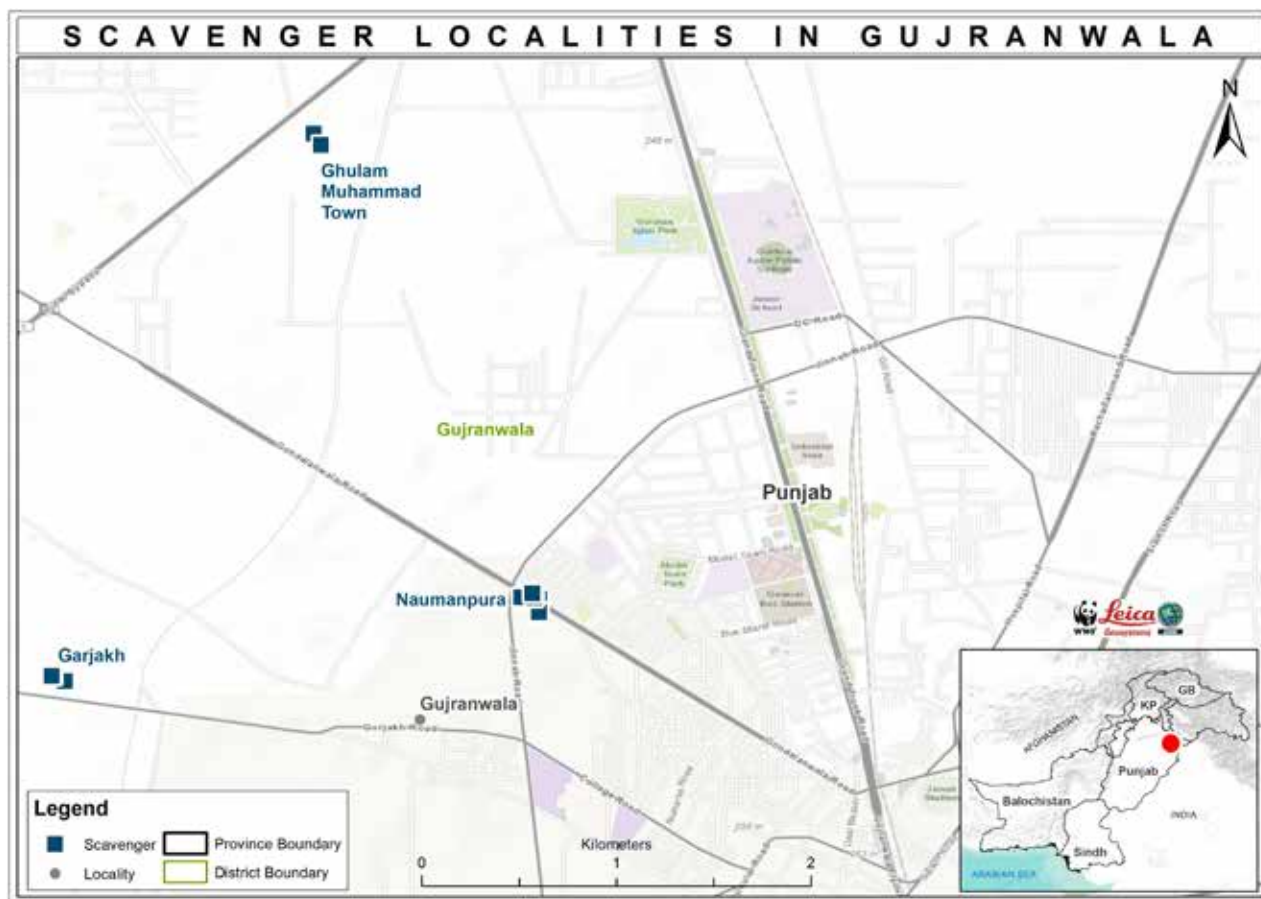


Figure 156: Scavenger locations in Gujranwala

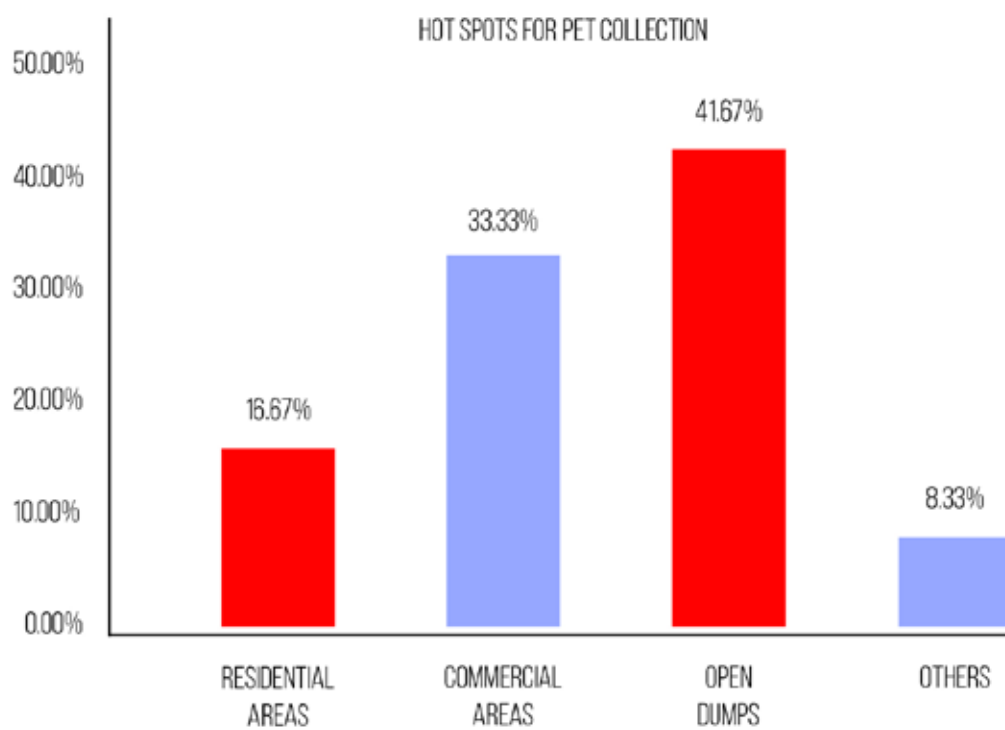


Figure 157: Scavenger hotspots for PET collection in Gujranwala

According to Figure 157, the major area for the collection of PET for scavengers in Gujranwala are open dumps but a huge chunk is also collected from commercial and residential areas.

Figure 158 shows that 75 percent of scavengers in Gujranwala were willing to supply PET to a recovery facility.

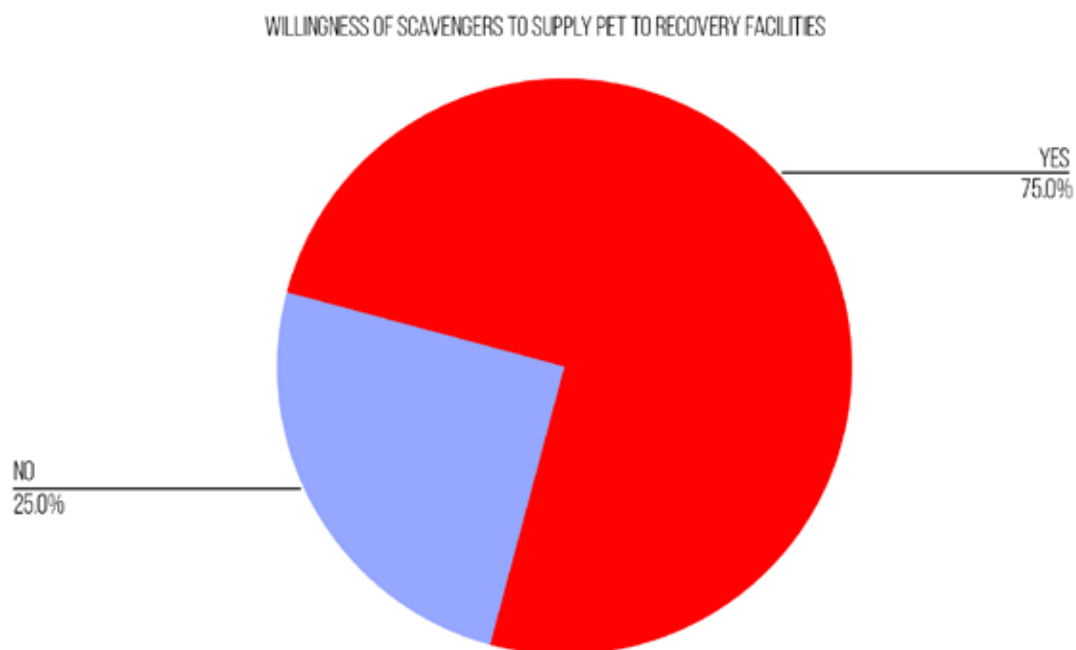


Figure 158: Willingness of scavengers to supply PET to recovery facilities, Gujranwala



Figure 159: Scavengers unloading waste from their donkey cart in Gujranwala

5.2.9.5 JUNK DEALERS

Only one junk dealer was visited in Gujranwala in April 2019 based on convenience. The junk dealer's location was found through facilitation provided by GWMC. His location is marked on the map in Figure 160.

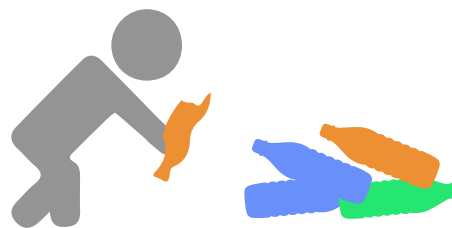


Figure 160: Locality of junk dealer, Gujranwala

The junk dealer purchased a total of 2,500 kg PET bottles from scavengers, which he bought separately from other waste materials.



Junk dealer purchased 2,500 kg PET bottles from scavengers.

Figures 161 and 162 depict the PET waste yards of the junk dealer in Gujranwala.



Figure 161: Heaps of PET waste at junk dealer's waste yard, Gujranwala

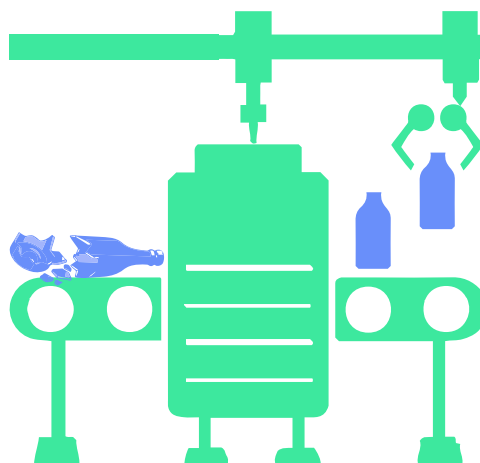


Figure 162: Sacks of PET bottles supplied by scavengers, Gujranwala

5.2.9.6 RECYCLERS

Two recyclers in Gujranwala were visited and interviewed. One was located in Mufti Colony, while the other was in Ghulam Mohammad Town. The locations have been mapped in Figure 165. The recyclers simply crushed PET on a large scale and sold it to buyers in Lahore and Faisalabad.

Figures 163 and 164 show the crusher units at the two recycling facilities in Gujranwala.



Two recyclers were visited and interviewed in Gujranwala.



Figure 163: Crusher unit at a recycler's facility in Gujranwala



Figure 164: Crusher unit of recycler, Gujranwala

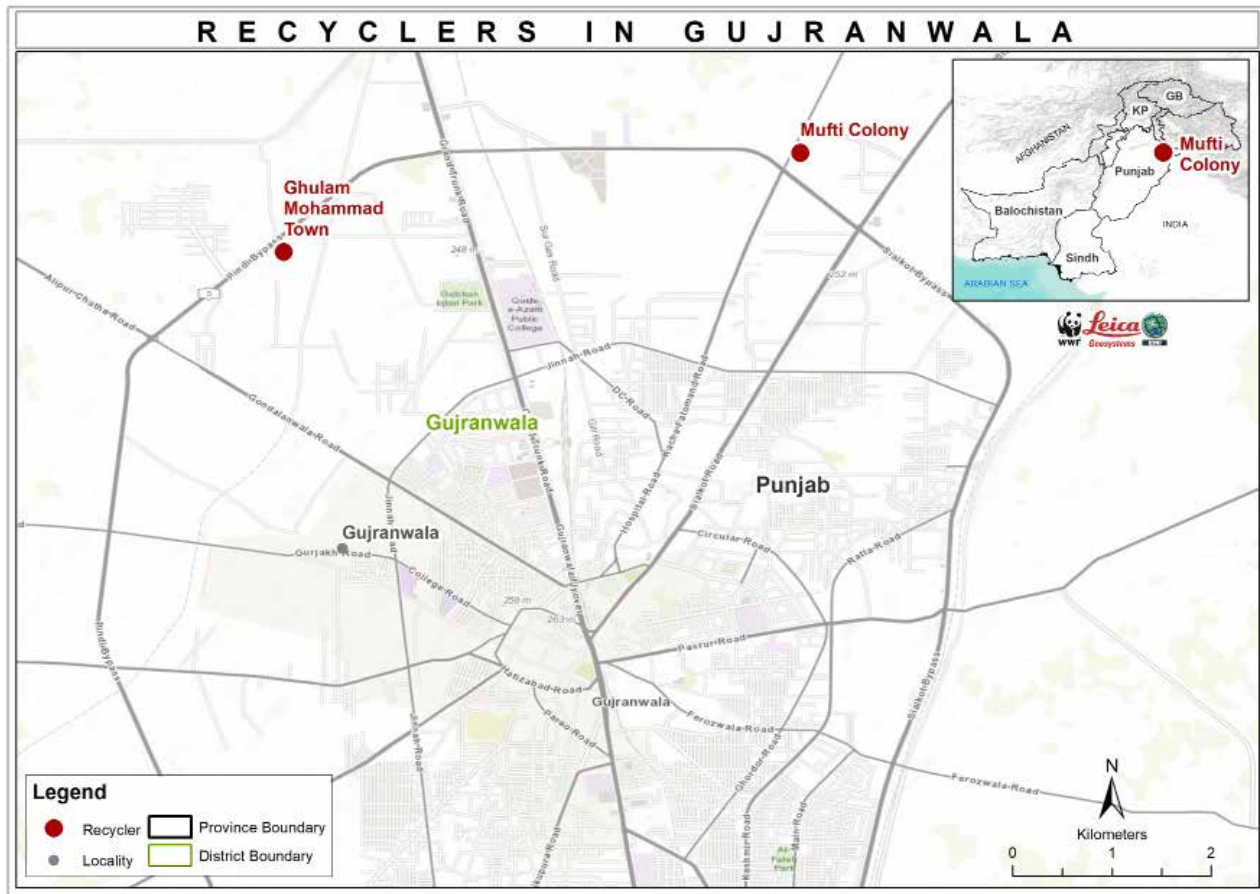
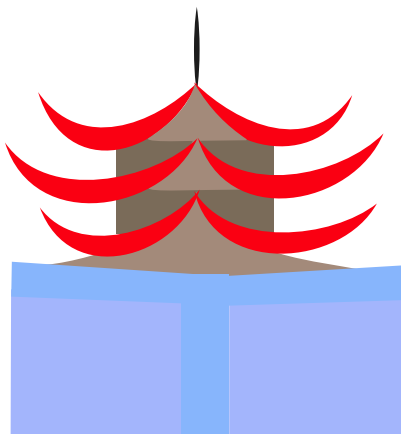


Figure 165: Localities of recyclers, Gujranwala

5.2.10 GILGIT-BALTISTAN

Visits to Gilgit-Baltistan were conducted mainly in June 2019 and around 216 stakeholders belonging to households, the commercial sector and PET supply chain were interviewed.



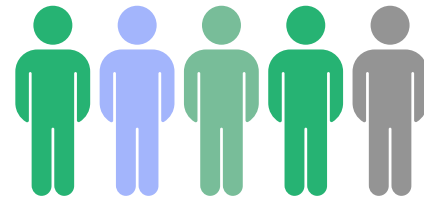
5.2.10.1 WASTE MANAGEMENT COMPANIES

Gilgit-Baltistan Waste Management Company (GBWMC) is responsible for the collection and disposal of waste in the area, hence meetings were held with GBWMC management in April 2019. According to the waste management company, the entire city has been mapped out to depute employees ensuring the maximum area is covered. Rickshaws have been deployed to pick up waste from narrow routes and door-to-door collection is being carried out. Furthermore, about 50 tonnes of waste is generated from the entire region and approximately 40 to 45 tonnes of waste is collected and transported to dump sites by GBWMC. The uncollected waste lies in inaccessible areas, hence there is a dire need for a proper landfill site in Gilgit city for efficient waste disposal.

5.2.10.2 HOUSEHOLDS

Surveys in households were carried out in the city of Gilgit and the locations marked in Figure 166. The interviewees were students and teachers of Karakoram International University, Falcon Public School and Elyson School. In addition, door-to-door surveys were also conducted in different mohallahs of Khomer, Zulfiqarabad and Danyore.

Almost 190 individuals completed the survey questionnaires to represent the results below.



190 individuals completed survey questionnaires.

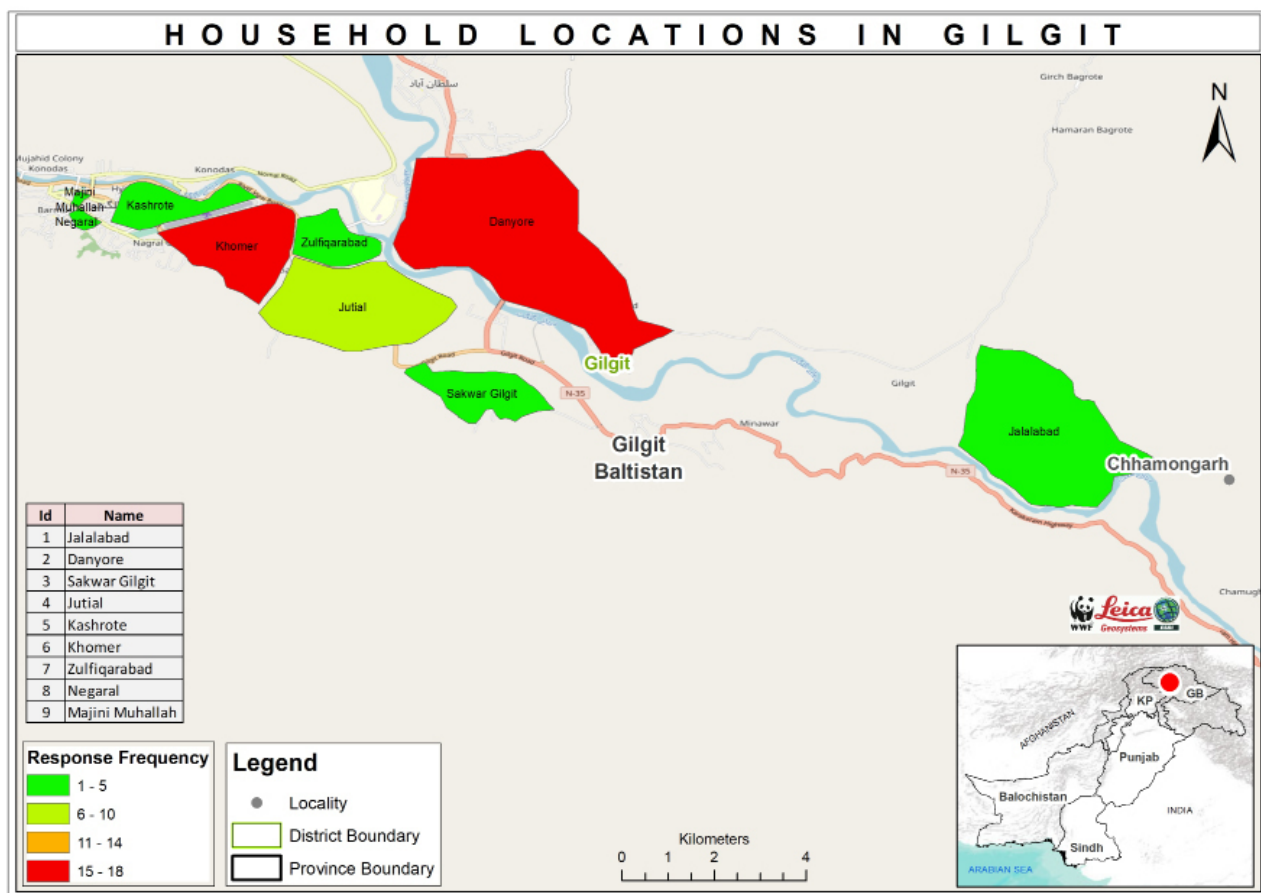


Figure 166: Localities of households, Gilgit

According to Figure 167, for 74 percent of the respondents, plastic bags were a major component of household plastic waste while 21 percent stated that PET bottles were the major item found in their plastic waste.

74 %

respondents claimed plastic bags were the major component of plastic waste.

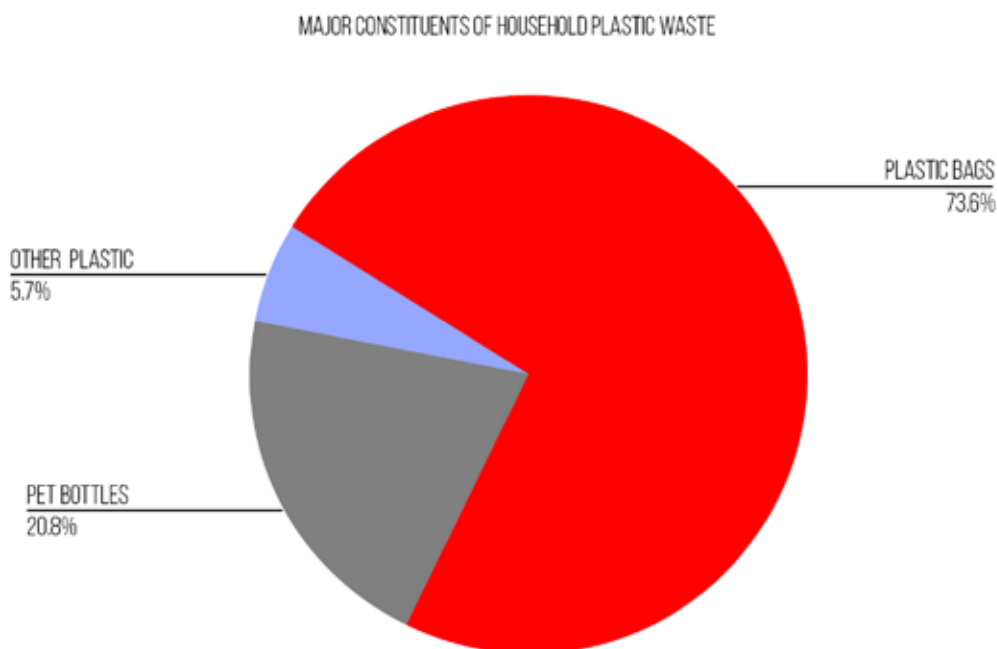


Figure 167: Major constituents of household waste in Gilgit

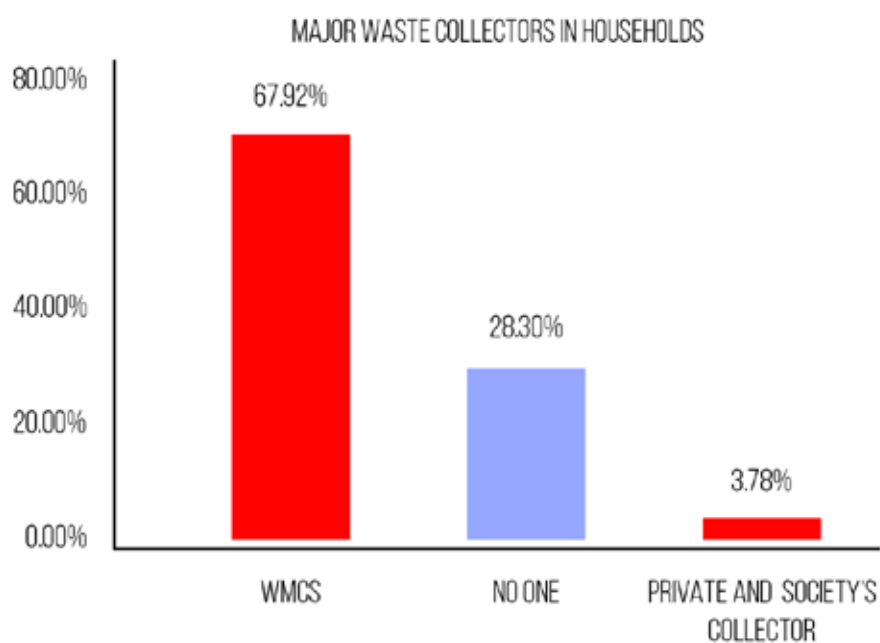


Figure 168: Major waste collectors in households of Gilgit

Figure 168 represents that almost 68 percent of households have waste management companies picking up their waste, while 28 percent of respondents had no waste collectors because they reside in inaccessible areas.

28 %

respondents had no waste collectors.



Figure 169 depicts that almost 89 percent of citizens in Gilgit were willing to provide their PET waste to a recovery facility for proper recycling and disposal.

89 %

citizens were willing to provide PET waste to a recovery facility for recycling.

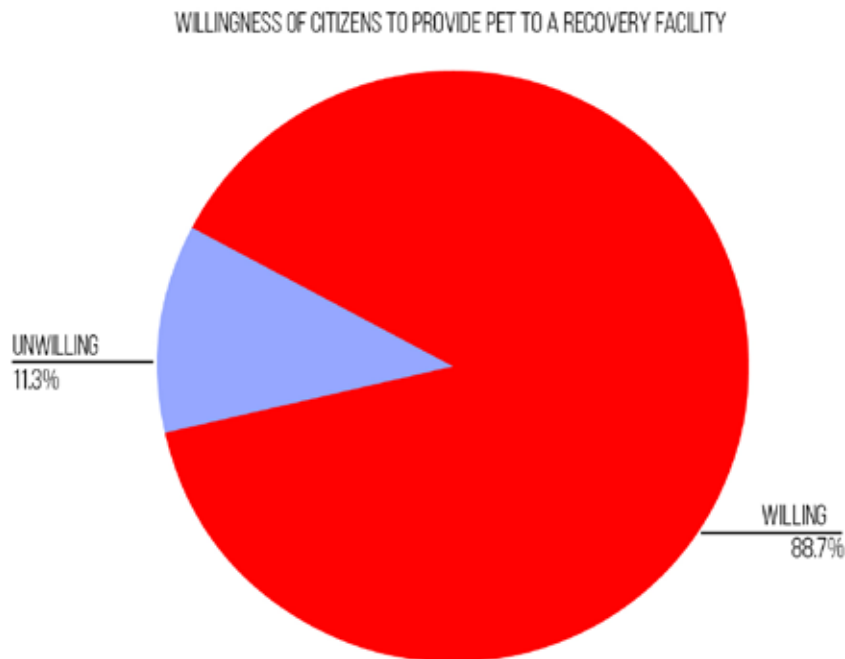
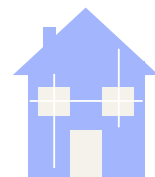


Figure 169: Willingness of Gilgit's citizens to provide PET to a recovery facility

5.2.10.3 COMMERCIAL SECTOR

To understand the commercial sector's trend of PET bottle usage, three hotels i.e. Serena, Marco Polo and Park Hotel were surveyed along with five restaurants in the city. Three institutes were also covered including the Karakoram International University, Falcon Public School and Elysion School. The map in Figure 170 shows the locations of the areas visited.



3 HOTELS



5 RESTAURANTS



3 INSTITUTIONS

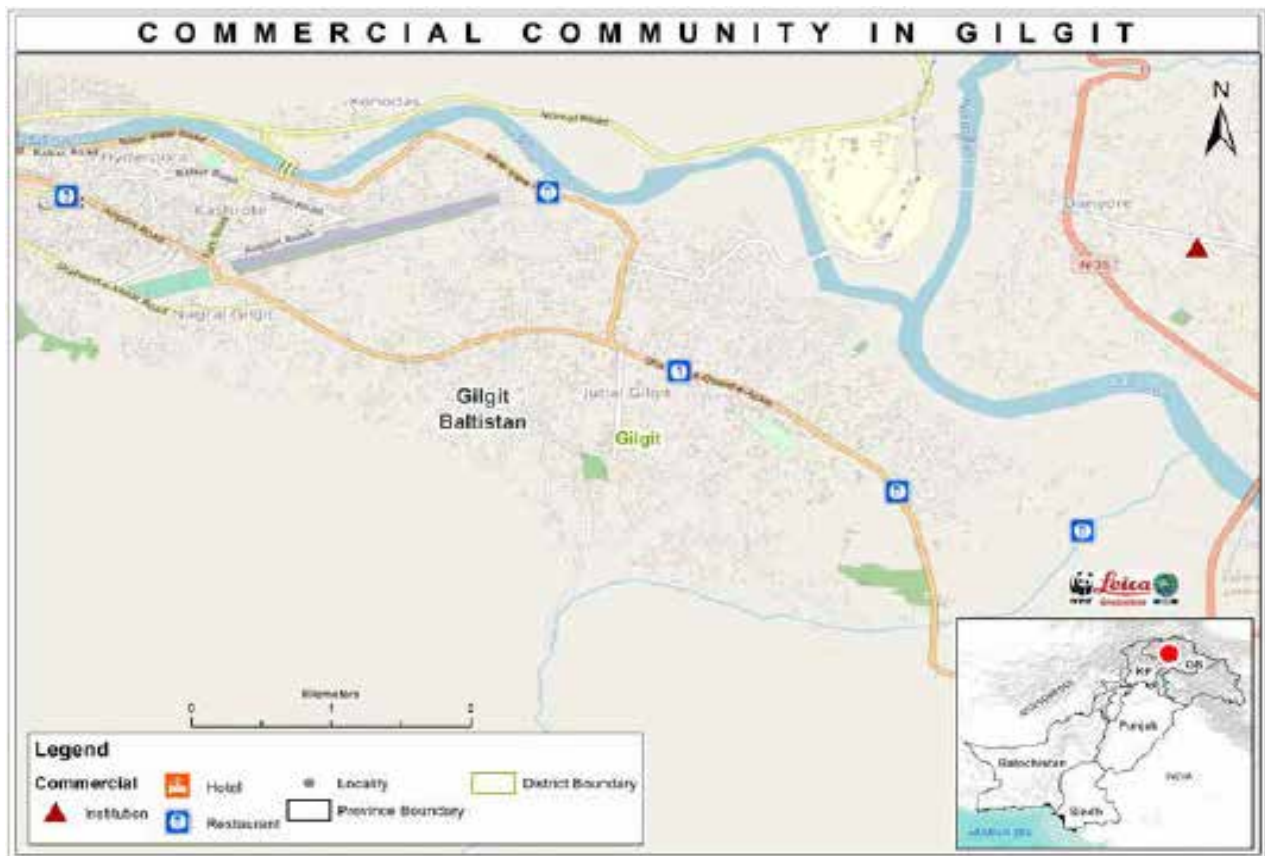


Figure 170: Localities of the commercial community, Gilgit

According to Figure 171, 57 percent of commercial areas surveyed said that they segregated their recyclables and non-recyclable items from their waste.

57 %

commercial areas segregate recyclables and non-recyclable waste.

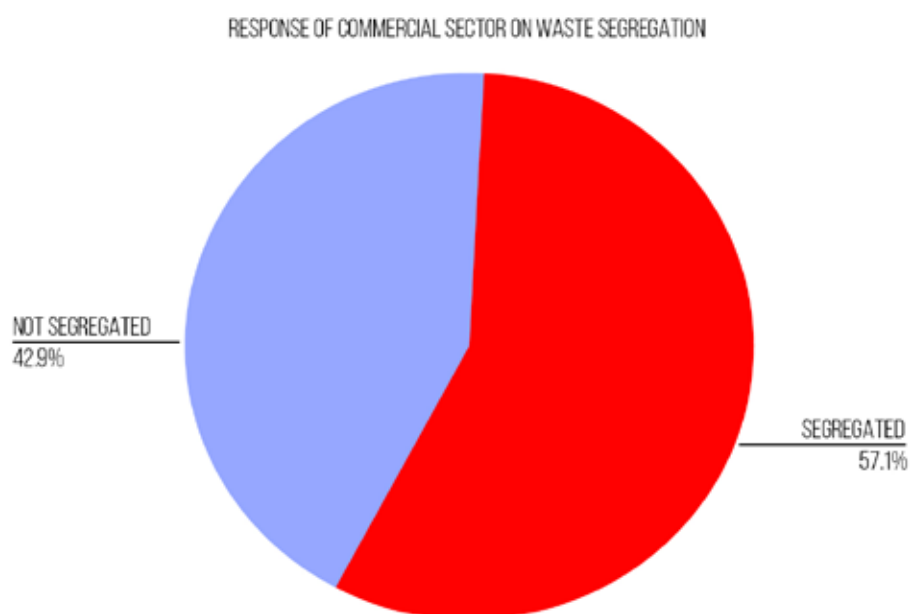


Figure 171: Response of Gilgit's commercial sector on waste segregation

AVERAGE PET WASTE GENERATION (KG/MONTH)

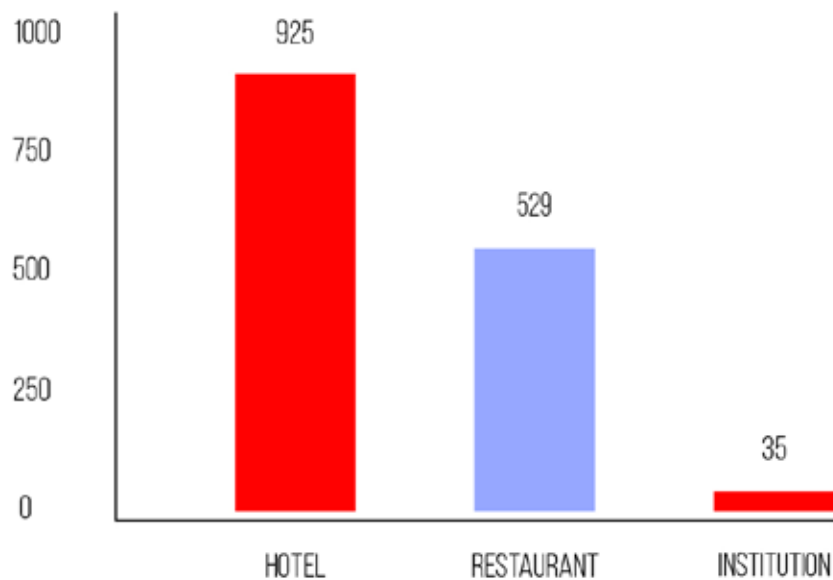
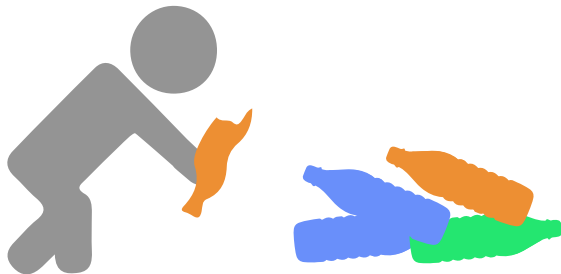


Figure 172: Average PET waste generated in commercial sector in kg per month

The bar chart in Figure 172 shows that hotels in the commercial sector of Gilgit consumed a higher number of PET bottles. The average consumption was 925 kg per month per hotel. Also, restaurants followed with an average usage of 529 kg per month per restaurant.



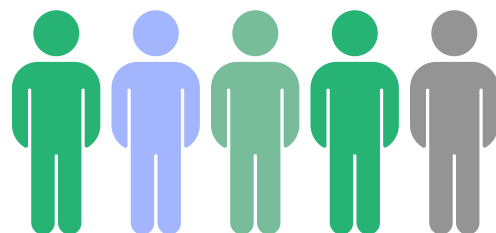
Average use of 925 kg PET bottles per month per hotel in Gilgit.



Average use of 529 kg PET bottles per month per restaurant in Gilgit.

5.2.10.4 SCAVENGERS

The scavengers in Gilgit mainly collect PET bottle waste in groups and sometimes individually. Usually, the scavengers collect PET bottle waste from streets, markets, commercial waste collection sites and transfer stations of the GBWMC. These scavengers are mostly children who sell the collected PET waste on a daily basis to junk dealers in Gilgit city. The scavenger locations are shown in Figure 173.



Scavengers are mostly children who sell collected PET on a daily basis.



Figure 173: Localities of scavengers, Gilgit

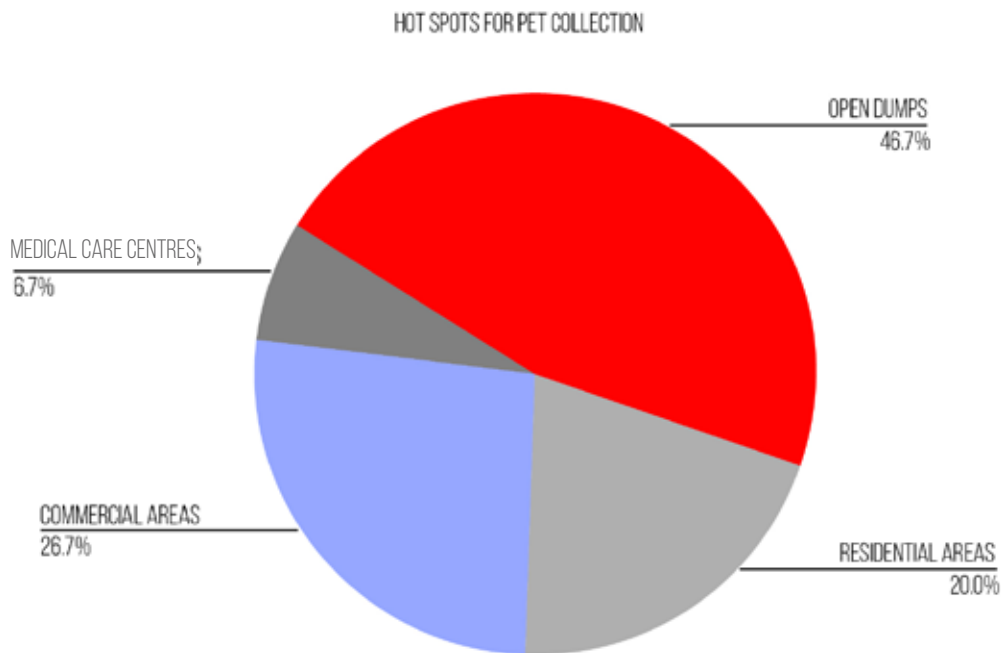


Figure 174: Scavengers' hotspot for PET collection in Gilgit

Almost 35 kg of waste is collected by each scavenger on a daily basis. Figure 174 shows that 47 percent of scavengers collect PET from open dump sites, while 27 percent respondents collect it from commercial areas, and 20 percent collect it from residences whereas a small fraction (7 percent) is gathered from medical care centres. Since child labour is dominant in the informal waste management sector, interviews with under-aged waste pickers were also conducted.

According to Figure 175, 73 percent of scavengers were willing to supply PET bottles to a recovery facility. However, 27 percent were not willing to do so, since they were either satisfied with the current process of PET collection or were fearful of the repercussions of leaving their current contractor.

47 %

PET collected from open
dumpsites.

27 %

PET collected from commer-
cial areas.



WILLINGNESS TO PROVIDE PET TO A RECOVERY FACILITY

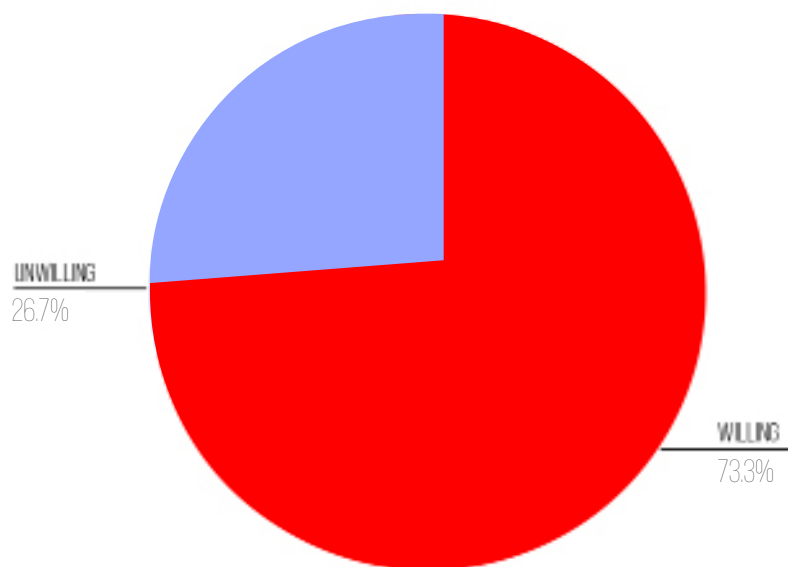
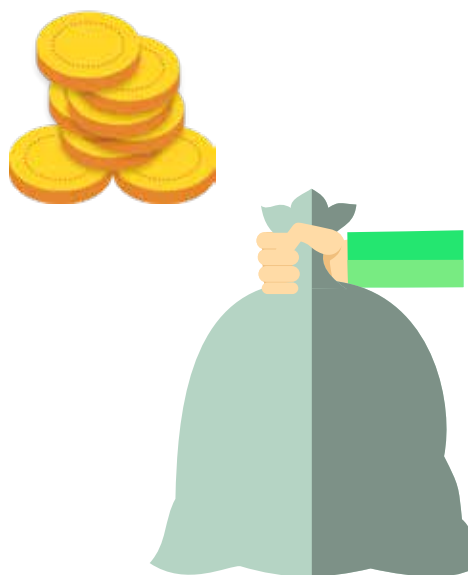
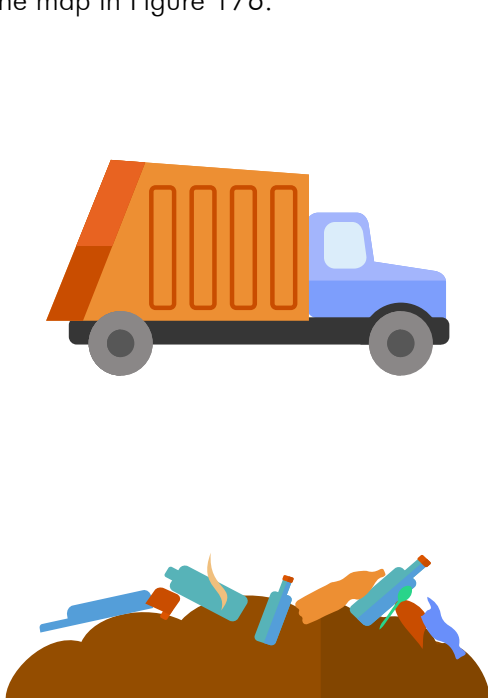


Figure 175: Willingness of Gilgit's scavengers to supply PET to a recovery facility

5.2.10.5 JUNK DEALERS

The junk dealers of Gilgit-Baltistan transfer collected PET bottle waste for sale to the south, mostly to cities such as Rawalpindi, Peshawar and Lahore. Three junk dealers were visited and interviewed in Gilgit. Their locations are marked on the map in Figure 176.

According to interviews and questionnaires conducted, all junk dealers purchased PET separately from other waste materials as buying the PET separately makes it easier for them to sell it to the relevant recyclers/dealers.



Junk dealers purchased PET separately from other waste materials

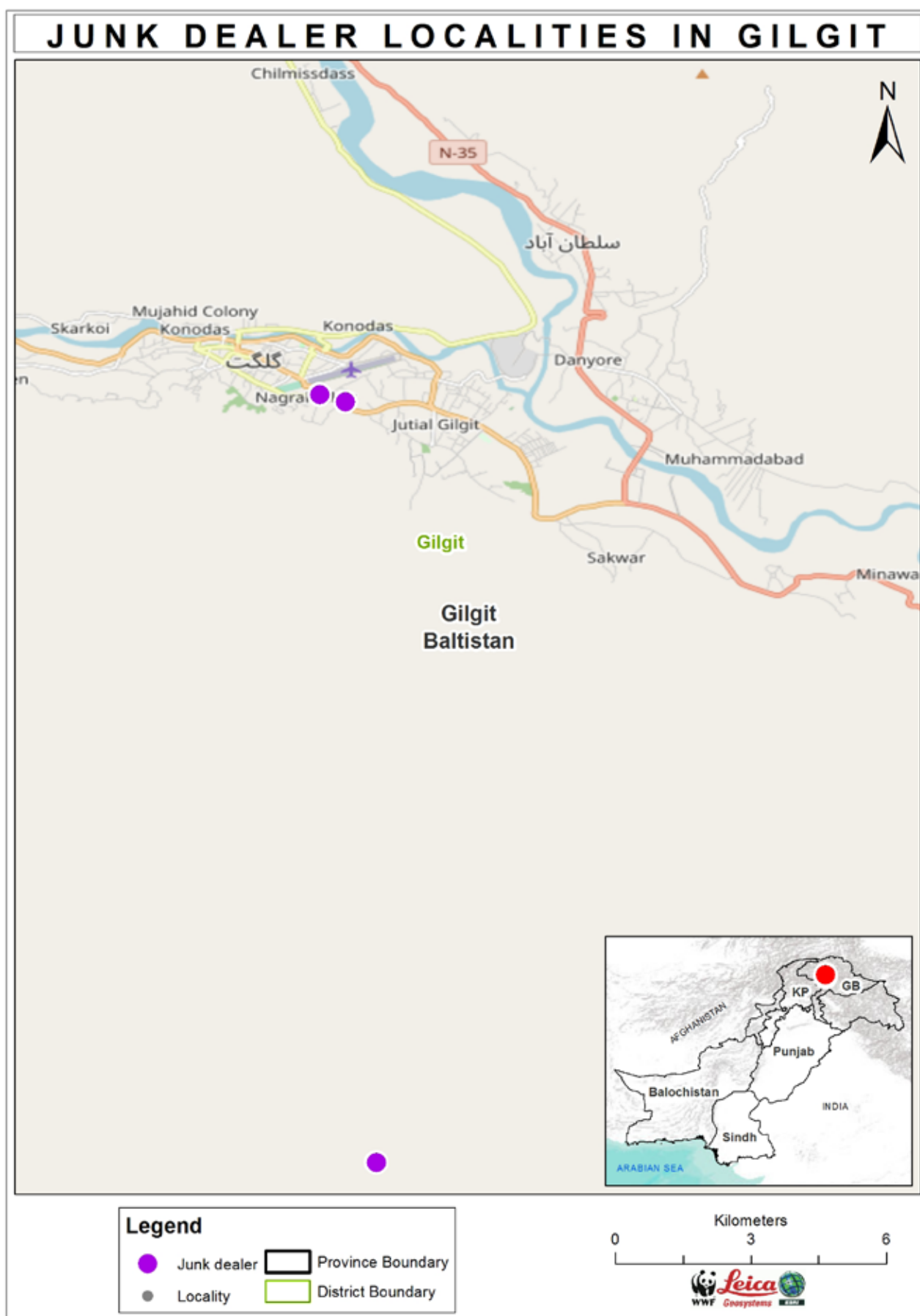


Figure 176: Localities of junk dealers, Gilgit

5.2.10.6 RECYCLERS

The only recycling agency working in Gilgit is AA Solution Private Limited located in Kashrote, as depicted in Figure 177. The agency collects used PET bottles from Gilgit-Baltistan Waste Management Company's transfer station and also has an agreement with GBWMC for paid services, which includes collection and segregation of PET bottles. The company transfers the collected PET waste to Peshawar and Mardan, while paying an extra fee of PKR 50,000 per truck as transportation charges. Figures 178, 179 and 180 show some glimpses of the PET crushing facility.



Figure 178: Heaps of PET bottles at a recycler's facility in Gilgit



Figure 177: Locality of recyclers, Gilgit



PKR 50,000

charged as
transportation fee per truck



Figure 179: PET bottles packed in sacks ready for transportation



Figure 180: Crushing unit in Gilgit

5.3 ANALYSIS OF WASTE MANAGEMENT IN SELECTED CITIES

Waste collection of all cities was compared with the overall waste generation to calculate efficiency. The bar chart in Figure 181 represents the comparison between the two variables, while Table 4 depict the comparison in percentages. It was found that Lahore has the highest waste collection efficiency (i.e. over 80 percent) since LWMC is the oldest and most well-established company. Furthermore, Multan has the lowest collection efficiency (only 50 percent) since waste is not formally collected in the city and MWMC was only recently established.

In addition, despite having the highest waste generation, Karachi has a collection efficiency of only 60 percent.

Moreover, Faisalabad only has a collection efficiency of 70 percent, hence a lot of waste is openly dumped.

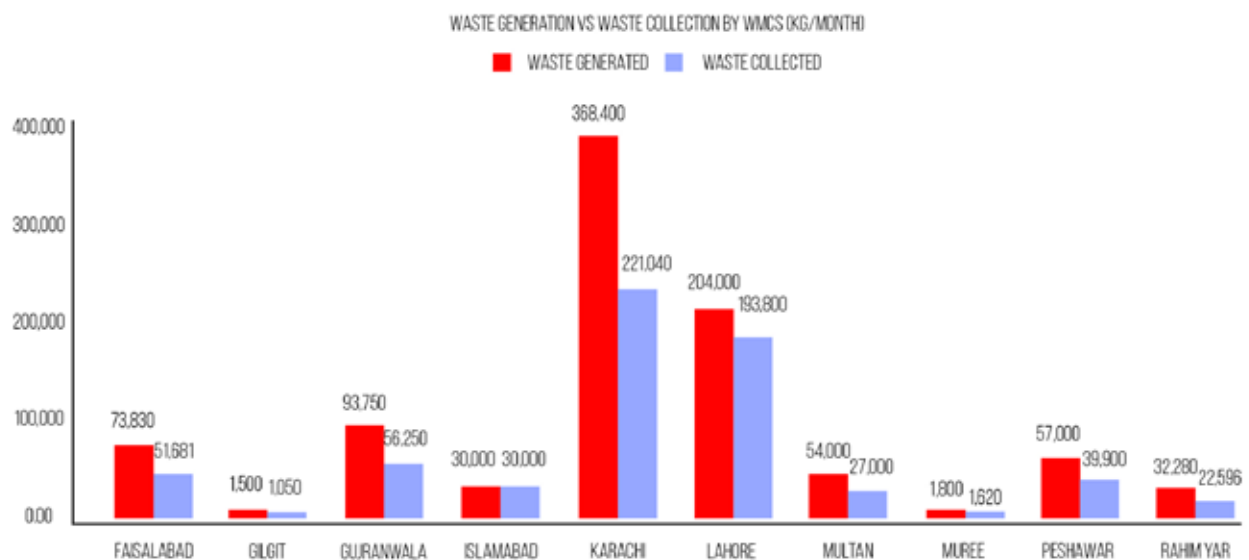


Figure 181: Waste generation vs waste collection per month by WMCs in all cities

| Faisalabad | Gilgit | Gujranwala | Islamabad | Karachi | Lahore | Multan | Murree | Peshawar | Rahim Yar Khan |
|------------|--------|------------|-----------|---------|--------|--------|--------|----------|----------------|
| 70% | 70% | 60% | 100% | 60% | 95% | 50% | 70% | 70% | 70% |

Table 4: WMCs waste collection efficiency in selected cities

5.4 RESPONSES OF HOUSEHOLDS IN SELECTED CITIES

The bar chart in Figure 182 depicts that one individual in Multan consumes an average of 23 PET bottles per month, whereas a consumer in Gujranwala, Islamabad and Karachi only uses about 16 bottles per month.

On average, a citizen in all 10 cities uses about 19 PET bottles per month.

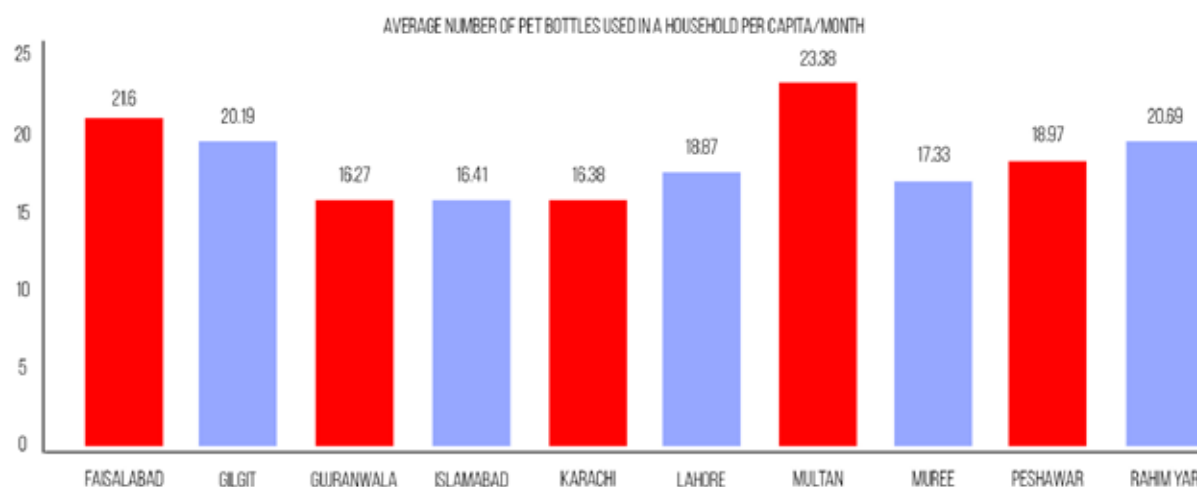
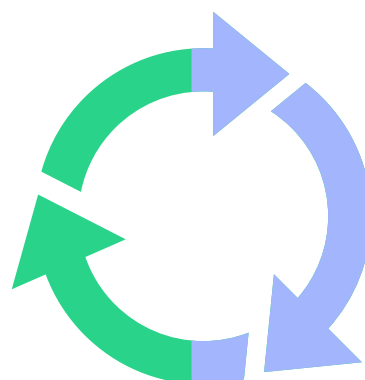


Figure 182: Average number of PET bottles used per capita per month in households

According to Figure 183, almost 83 percent of citizens in the selected regions were willing to supply their used PET bottles to a plastic recovery facility.

83 %

citizens were willing to supply PET bottles to a recovery facility.



CITIZENS' WILLINGNESS TO PROVIDE PET BOTTLES TO A RECOVERY FACILITY

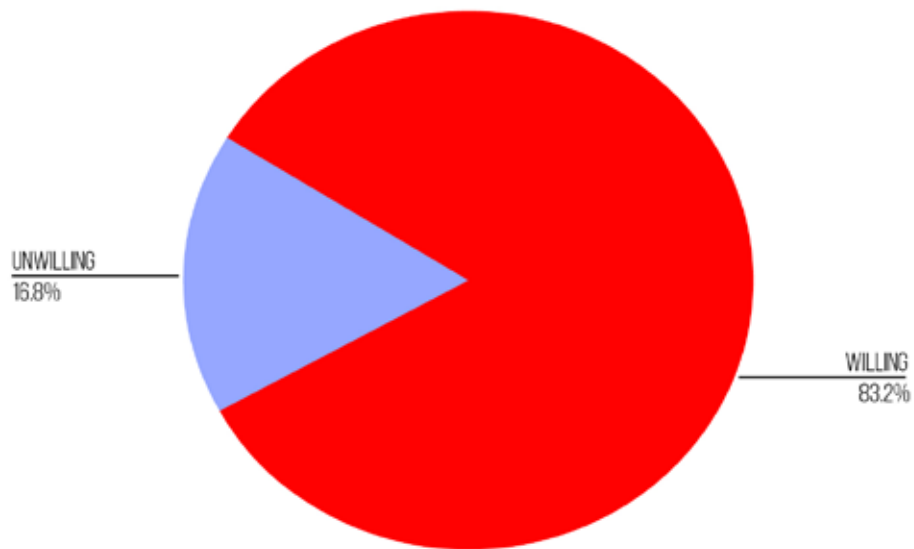


Figure 183: Willingness of households to provide their PET bottles to a plastic recovery facility

According to Figure 184, about 96 percent of respondents in the 10 cities believed that plastics were a major cause of pollution on land and in water bodies. However, four percent of individuals believed plastics were not a cause of pollution on land and in water bodies; this was because there was a lack of awareness amongst citizens on plastic pollution and can be explained by the fact that citizens were not cognizant of plastic pollution and its negative effects on the environment.



Figure 185: Bales of compressed PET bottles ready for transport

HOUSEHOLD PERCEPTION ON PLASTIC CAUSING POLLUTION

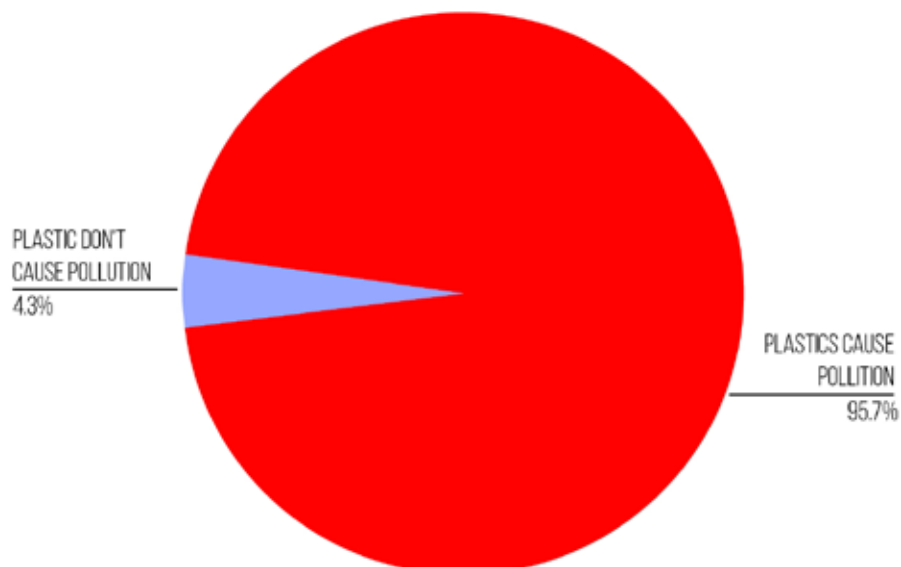


Figure 184: Awareness level of households on plastics causing pollution on land and water

5.5 RESPONSE OF THE COMMERCIAL SECTOR IN SELECTED CITIES

Hotels are the highest generators of PET waste, producing about 284 kg of PET waste per hotel. An institution produces an average of 119 kg of PET waste, while a restaurant generates a mean of 95 kg of PET waste. Restaurants mainly give cans or glass bottles to customers and thus their PET waste generation is lower. Hotels have greater consumption because of a high influx of guests year round.

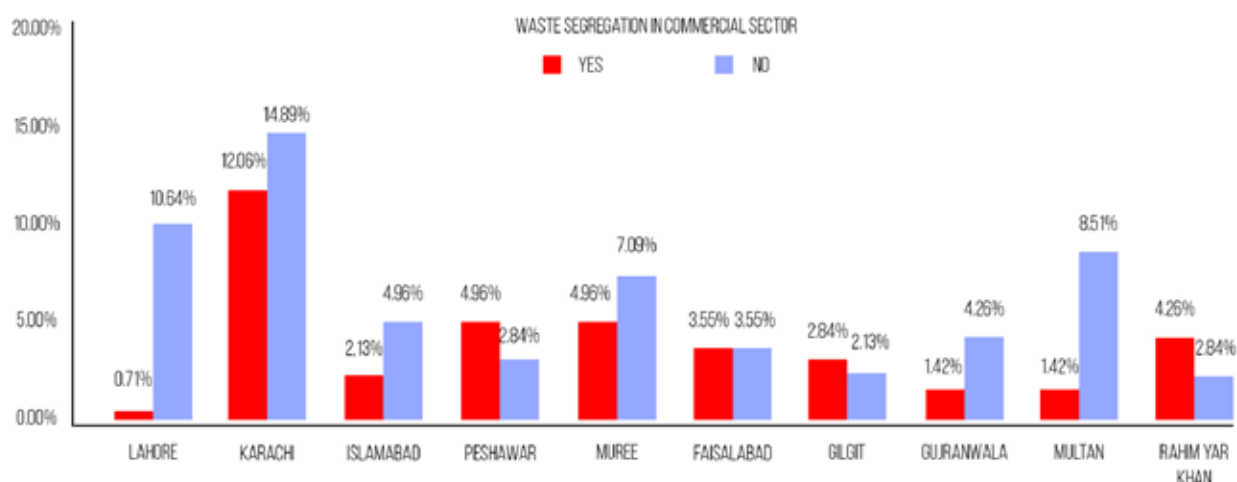
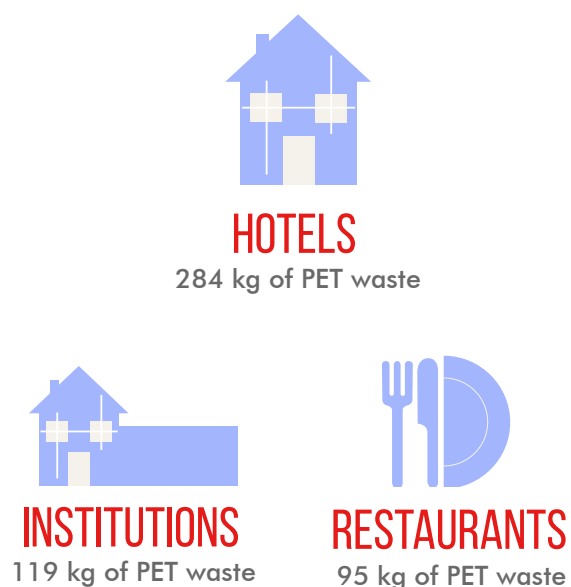


Figure 186: Commercial sector's response to segregating their waste in all selected cities

According to Figure 186, the majority of hotels, restaurants and institutions did not segregate their waste. The commercial sector in Karachi had the highest number of respondents that did not segregate their waste. However, in some cities like Murree, Faisalabad and Rahim Yar Khan, waste was segregated at source by the janitorial staff or private collectors.

5.6 RESPONSES OF SCAVENGERS IN SELECTED CITIES

It was found that most scavengers collected PET from open dumps in Lahore and Karachi whereas, scavengers in Islamabad, Peshawar, Faisalabad, Multan and Rahim Yar Khan collected PET from residential areas.

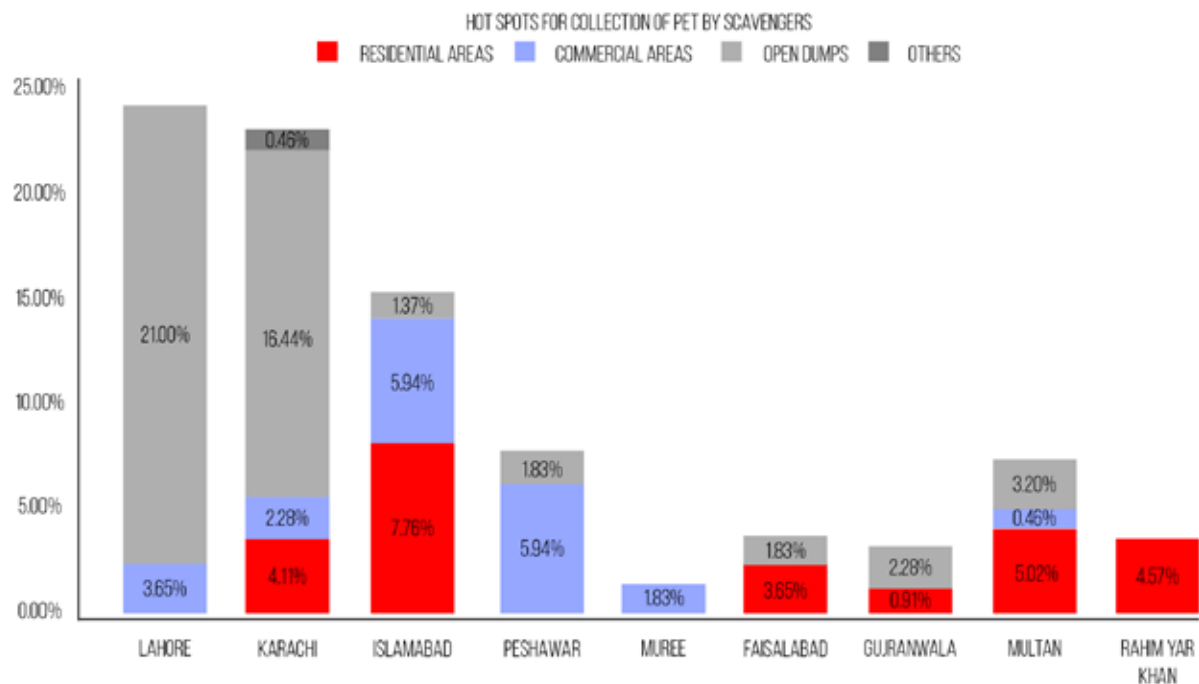


Figure 187: Hotspot areas for collection of PET waste by scavengers in each city

According to Figure 187, it was found that most scavengers collected PET from open dumps in Lahore and Karachi, i.e. 21 percent and 16 percent respectively; whereas most scavengers in Islamabad, Peshawar, Faisalabad, Multan and Rahim Yar Khan collected PET from residential areas. This is due to the fact that waste management companies in cities like Multan, Rahim Yar Khan and Faisalabad do not have access to all areas, hence waste picking activities from households are still done by scavengers. Scavengers in Murree solely collected PET from commercial areas such as hotels and restaurants. This is likely due to the high influx of tourists, and hence high consumption of PET all year round.

The average amount of PET collected by one scavenger in each city was calculated. Figure 188 represents that scavengers in Gilgit collect the most quantity of PET per day. This quantity can sometimes amount to over 31 kg, which is likely due to the fact that there are very few scavengers/waste pickers working in Gilgit city and there is high consumption of PET due to tourists. Karachi's scavengers are the second-highest collectors of PET and can collect over 22 kg of PET per day. On the contrary, scavengers in Multan only collect an average of 5 kg per day because workers in households, sweepers at hotels and restaurants, and the waste collectors segregate the PET waste and sell it before it even reaches a scavenger.

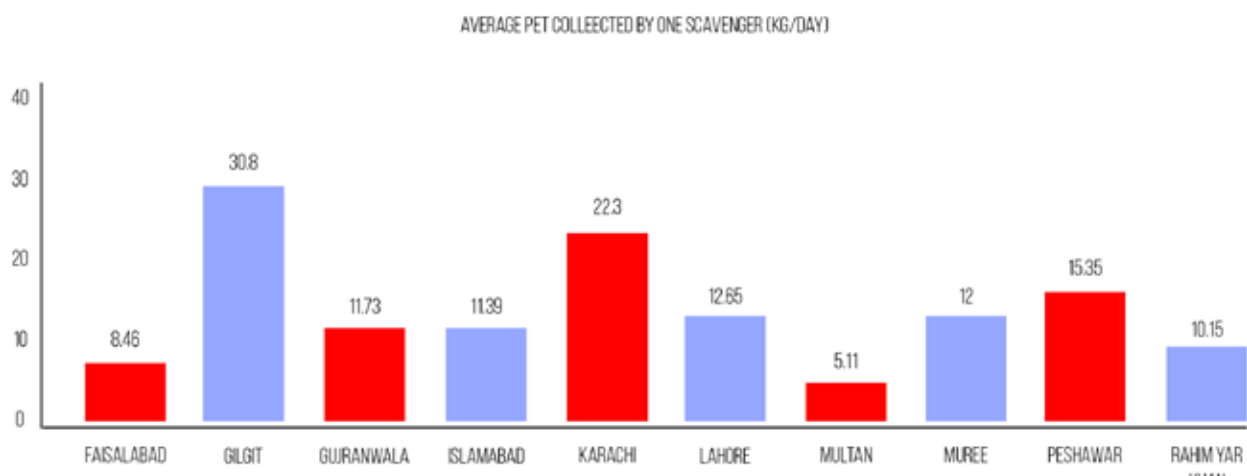


Figure 188: Average amount of PET collected by one scavenger per day

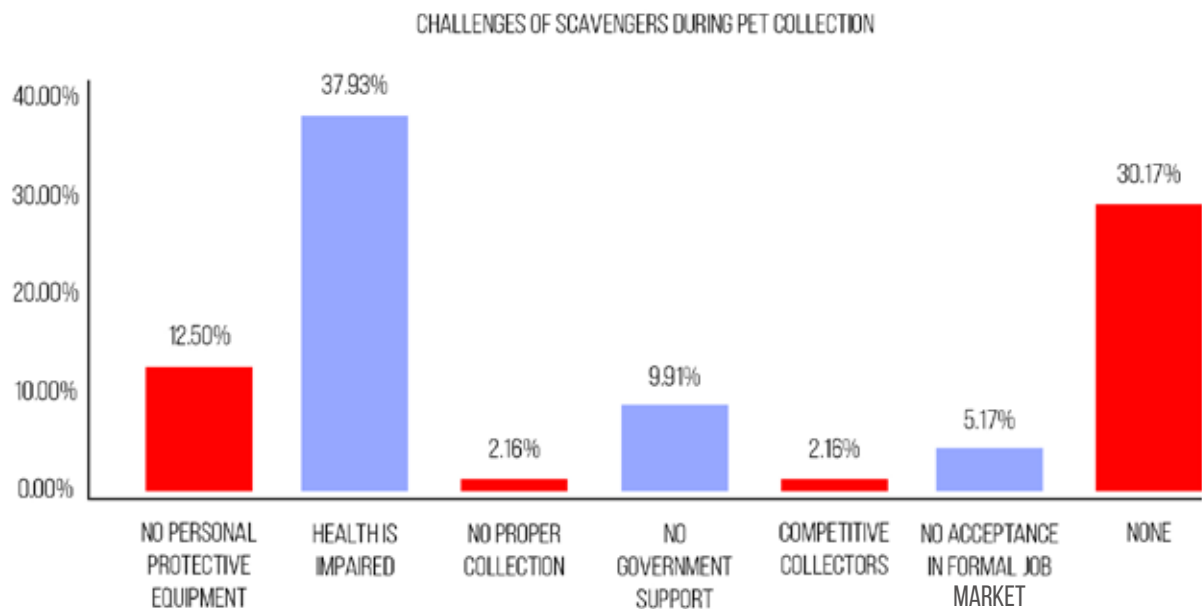


Figure 189: Challenges of scavengers in PET collection in 10 cities

After surveying scavengers in 10 different cities, it was found that a majority of them faced health issues due to their line of work. Most suffered from neck aches and backaches due to carrying heavy sacks filled with sellable waste. However, about 30 percent of respondents claimed that they faced no challenges because scavenging activities gave them the freedom to work however they wanted, at flexible times without any consequences that a regular job would hold. These results can be seen in Figure 189.

Figure 190 represents scavengers' responses to being asked about their willingness to supply PET to a recovery facility. While the majority of scavengers in each city were willing, the few scavengers unwilling were those who were already working for an informal contractor or those who found it more convenient to directly supply their collected PET to a junk dealer. Some were willing only if they were provided better amenities and financial support.

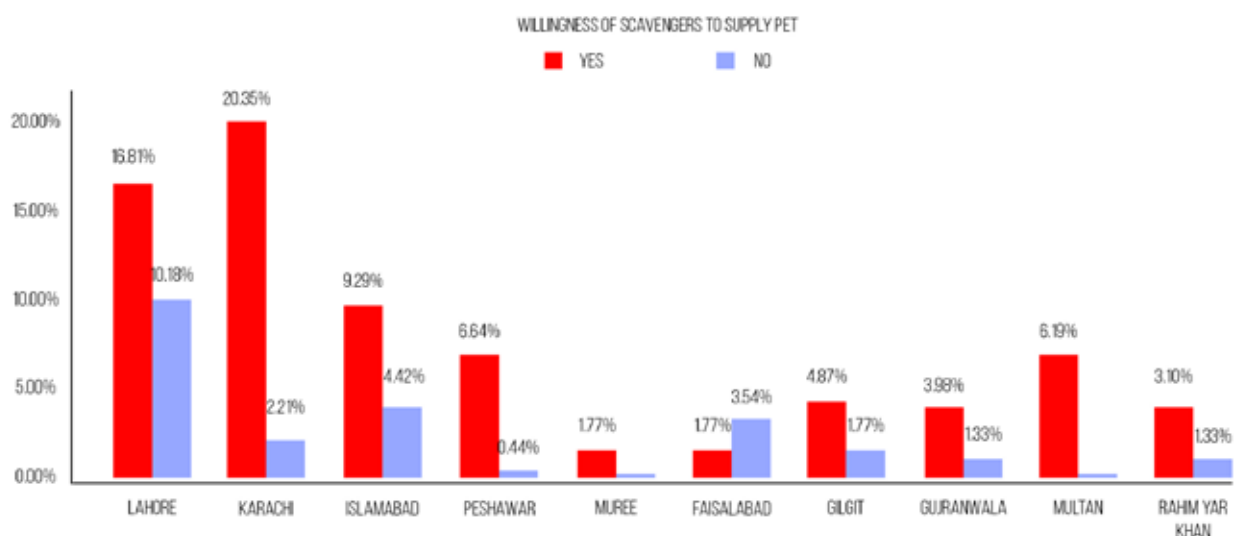


Figure 190: Willingness of scavengers to supply PET to a recovery facility

5.7 RESPONSES OF JUNK DEALERS IN SELECTED CITIES

Upon analysis, it was found that 60 percent of respondents bought PET waste with other sellable waste materials while 40 percent bought it separately, according to Figure 191.

Figure 192 reflects that the majority of junk dealers in all 10 cities were willing to supply their PET bottles to a recovery facility. About 32 percent of junk dealers were unwilling to do so because they believed their business might get affected or they might lose their source of livelihood.

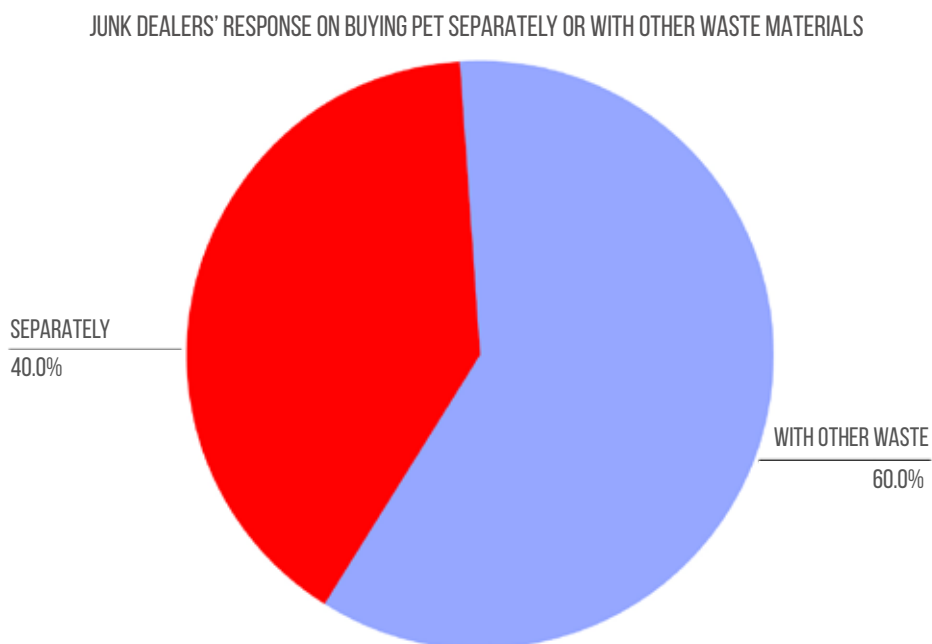


Figure 191: Junk dealers' response to buying PET separately or with other waste materials

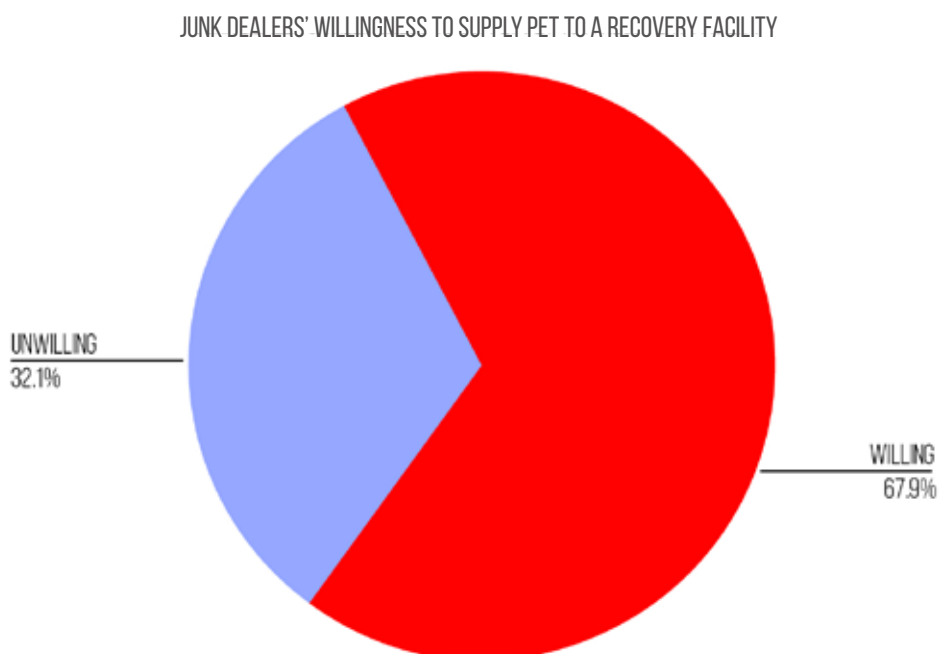


Figure 192: Junk dealers' willingness to supply PET to a recovery facility



Figure 193: Heaps of PET bottles ready to be exported



Figure 194: Collected PET bottles at a junk dealer

Heaps of PET bottles, to be exported, were seen at the junk dealer's facilities, as can be seen in Figures 193 and 194.

5.8 RESPONSES OF RECYCLERS IN SELECTED CITIES

According to Figure 195, on average, a recycler in Karachi recycles 350 tonnes per month and a recycler in Lahore crushes about 280 tonnes per month. In contrast, a recycler in Peshawar only recycles an average of three tonnes per month. This is because of the comparatively low population density of Peshawar, and hence, low consumption of PET.



AVERAGE AMOUNT OF PET BEING RECYCLED BY ONE RECYCLER IN EACH CITY (TONNES/MONTH)

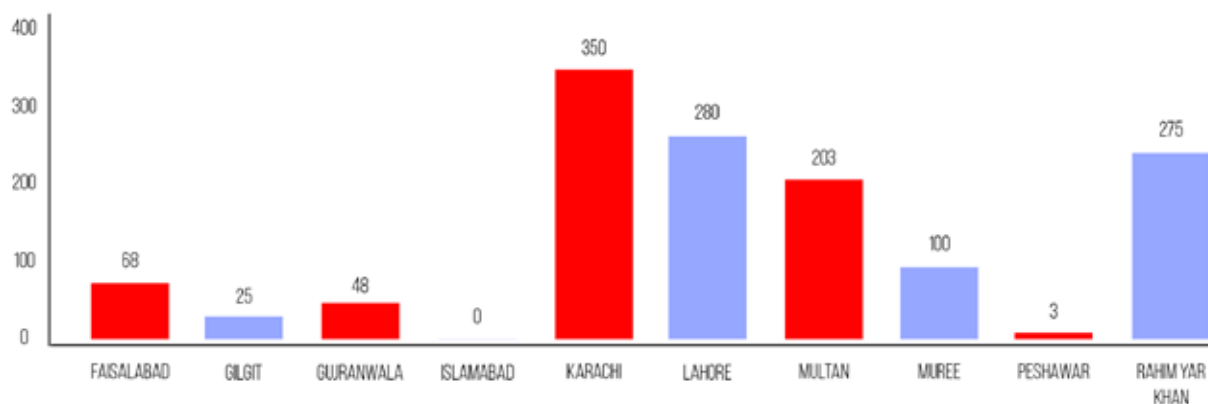


Figure 195: Average amount of PET recycled by one recycler in each city (in tonnes per month)

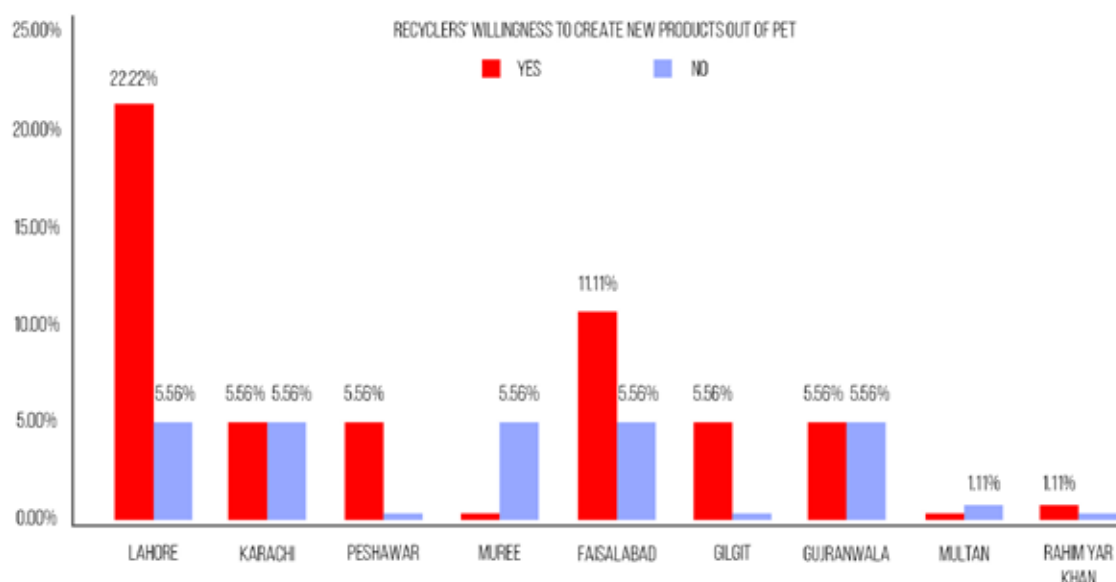


Figure 196: Recyclers' willingness to create new products out of PET

According to Figure 196, recyclers' willing to create new products out of PET were mostly found in Lahore. Murree and Multan's recyclers, however, showed no inclination of undertaking this task. In total, about 60 percent of recyclers in the 10 cities were willing to create new products out of PET. Most of them agreed only if the alternatives were cheaper or if someone was willing to invest in the new technology.



Figure 197: PET bottles ready to be recycled

Currently, 36 % of crushed PET flakes made by recyclers in the selected regions are incorporated into textiles while other uses include making resin to strengthen doors, creating PET bottles again and even making pharmaceutical products. The recycling facilities visited can be seen in Figures 197 and 198.

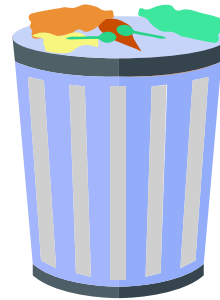


Figure 198: PET crushing facility



6. CONCLUSION AND DISCUSSION

PET bottles are used and disposed off abundantly in Pakistan where there is already an inefficient waste collection and recycling mechanism. In order to gain a holistic view of solid waste management in Pakistan, stakeholder perceptions on plastic pollution and recycling were taken into account. Furthermore, PET generation in each city, the percentages being recycled and the amount going to the dumpsites and water bodies were determined.



ALL STAKEHOLDERS' RESPONSE ON PLASTIC CAUSING POLLUTION

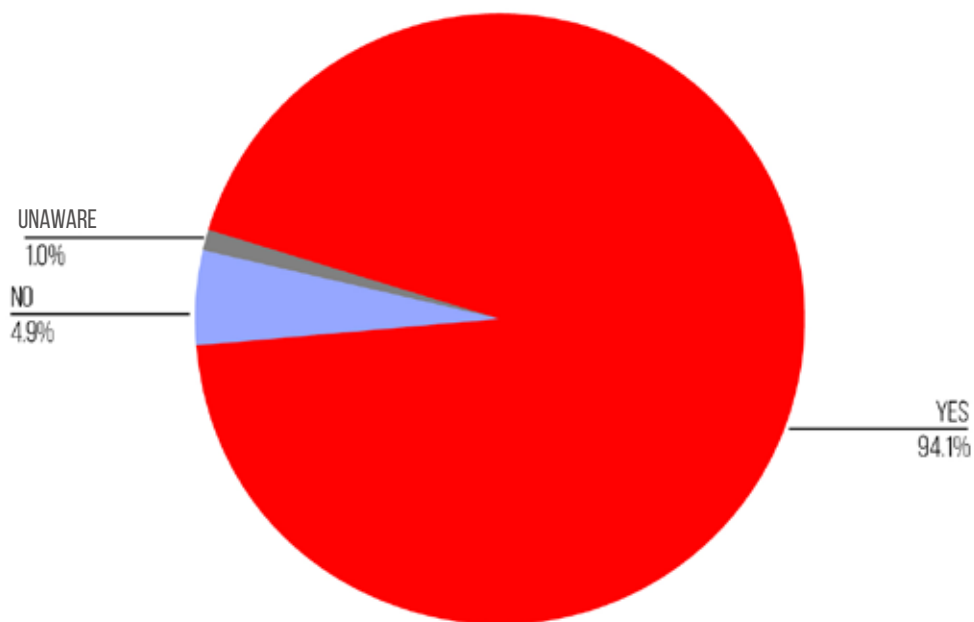


Figure 199: Response of all stakeholders on being asked whether plastics cause pollution

According to Figure 199, 94 percent of all stakeholders stated that plastics are a source of pollution, while the remaining six percent either disagreed or claimed that they were unaware of the situation. This six percent represents the informal or uneducated sector, which includes scavengers and even some junk dealers, whereas, the majority of households, commercial sector, recyclers and WMCs were aware of plastic pollution.

94 %

stakeholders stated plastics are a source of pollution.

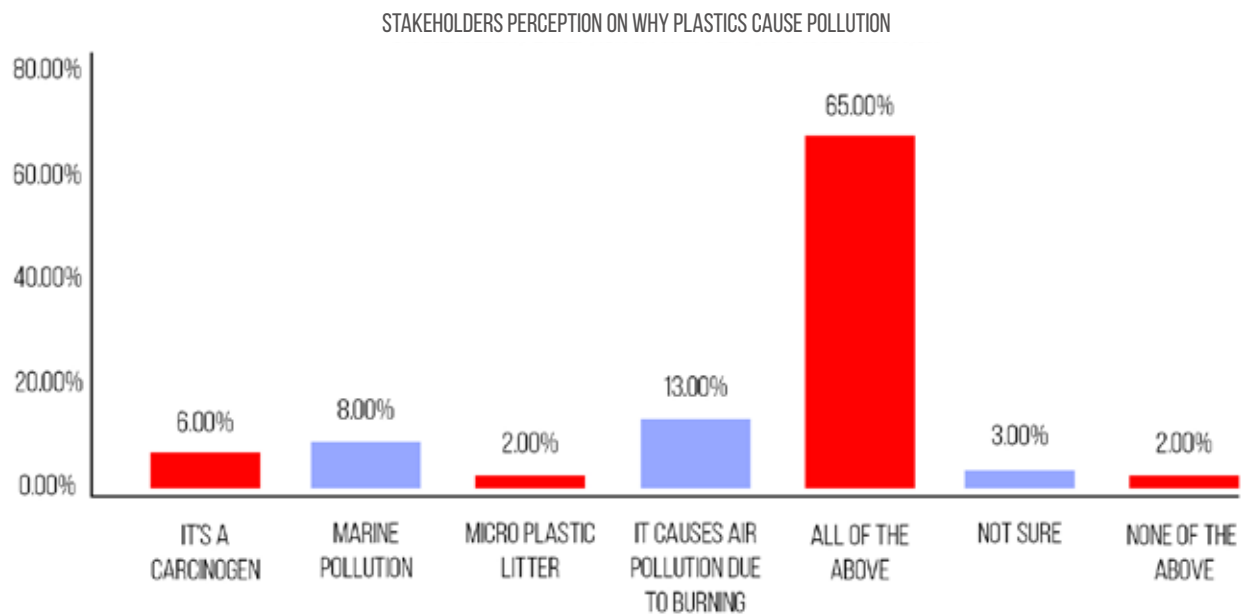


Figure 200: Stakeholder perception as to why plastics are causing pollution

According to Figure 200, it was found that the majority of stakeholders perceived that plastics are a source of pollution because they are carcinogenic, they cause marine pollution, contribute to microplastic litter and cause air pollution due to burning. There was a small percentage (three percent) of people that knew plastics caused pollution but were not sure of the reasons.

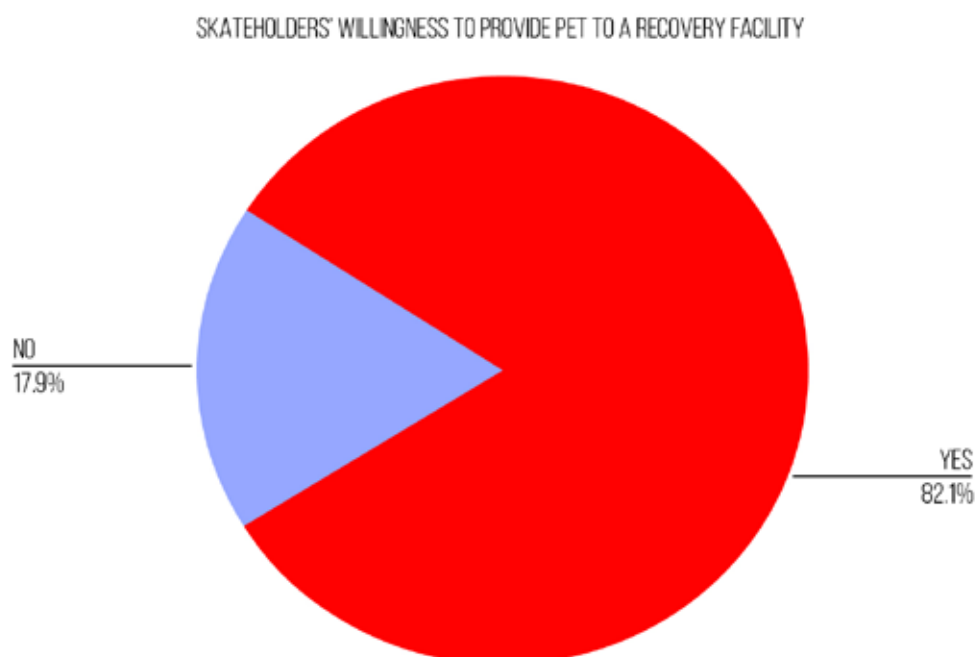


Figure 201: Stakeholder willingness to provide PET to a recovery facility

According to Figure 201, about 82 percent of all stakeholders were willing to provide PET to a recovery facility. However, about 18 percent were not willing to do so. The respondents who were unwilling were mostly junk dealers and scavengers who felt comfortable in the current supply chain, although some households also showed indifference towards the issue of PET pollution.

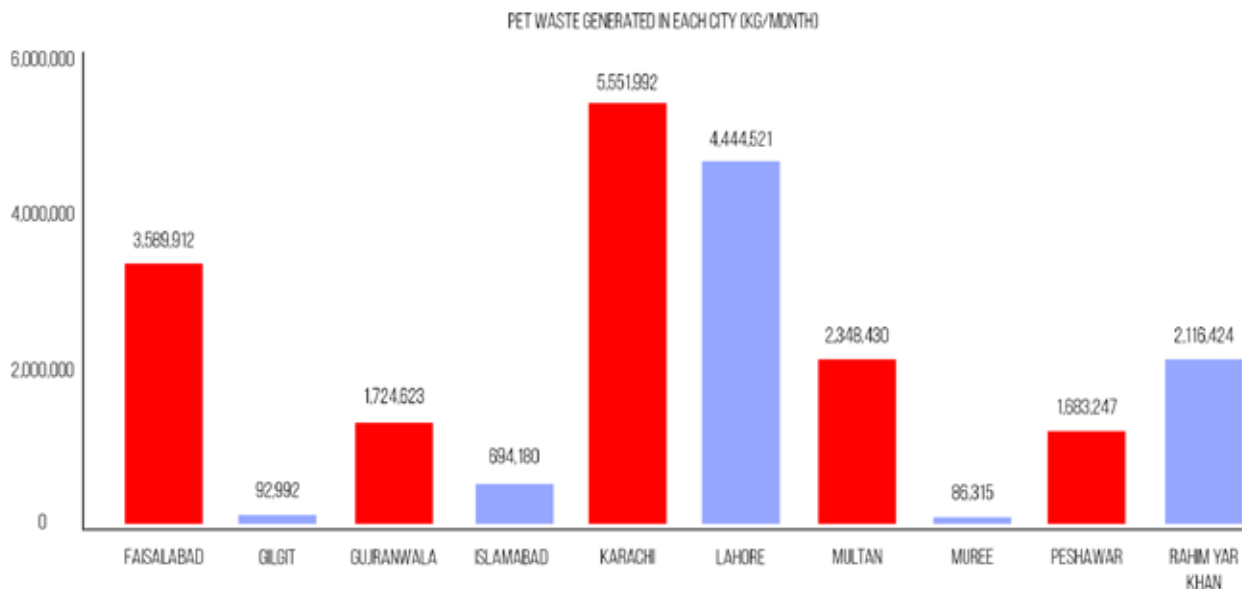


Figure 202: PET generated per month in kg in each city

According to Figure 202, Karachi generates 5,551,992 kg per month of PET waste, which is the maximum amount of PET generated in the 10 cities.

About 82 % of all stakeholders were willing to provide PET to a recovery facility. However, about 18 % were not willing to do so.

Lahore generates almost 4,444,521 kg per month of PET waste, while Multan and Rahim Yar Khan generate almost half off that amount. According to the figure, Gilgit and Murree generate the least amount of PET waste i.e. 92,992 kg and 86,315 kg respectively.



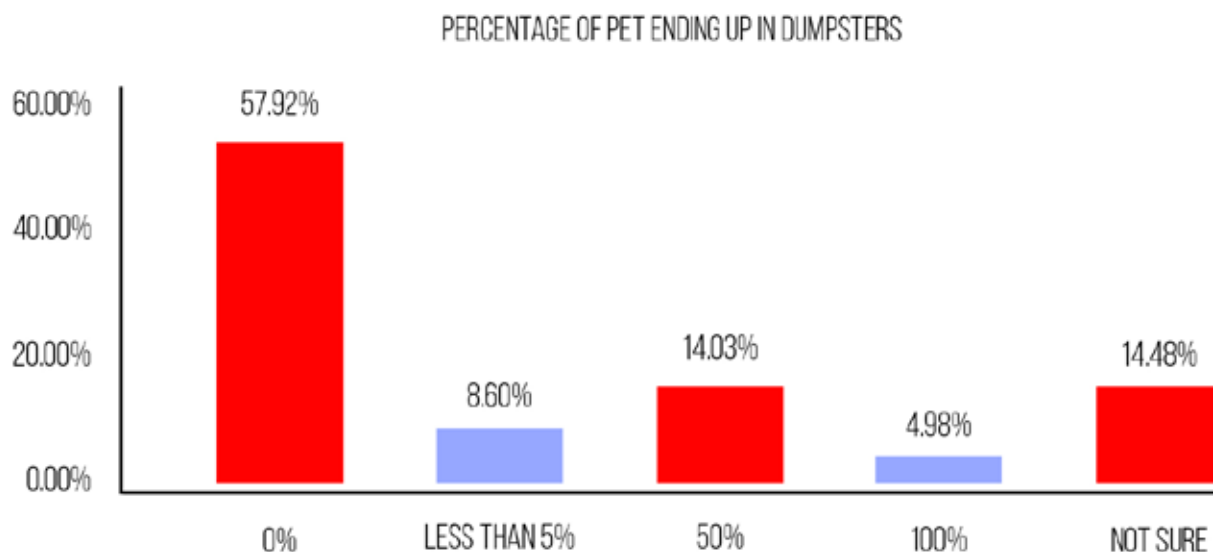


Figure 203: Percentage of PET in dumpsites and water bodies according to stakeholders in the PET supply chain

To identify the amount of PET that ends up in dumpsites and water bodies, the key players in the PET supply chain were interviewed and the results depicted in Figure 203. It was found that 58 percent of stakeholders in the supply chain stated that no PET waste leaks into water bodies and dumpsites, while only about five percent of stakeholders stated that all PET waste is either leaked into water bodies or dumped in open spaces. Overall, about 28 percent of stakeholders of the supply chain stated that some PET does leak into water bodies and dumpsites in varied quantities. A total of 15 percent of stakeholders were unsure about the status of PET waste.

About 58 % of stakeholders stated that no PET waste leaks into water bodies or dumpsites, while only about 5 % stated that all PET waste leaks either into water bodies or is dumped in open spaces.

58 %

of stakeholders stated no PET waste leaks into water bodies and dumpsites

5 %

of stakeholders stated that all PET waste is either leaked into water bodies or dumped in open spaces

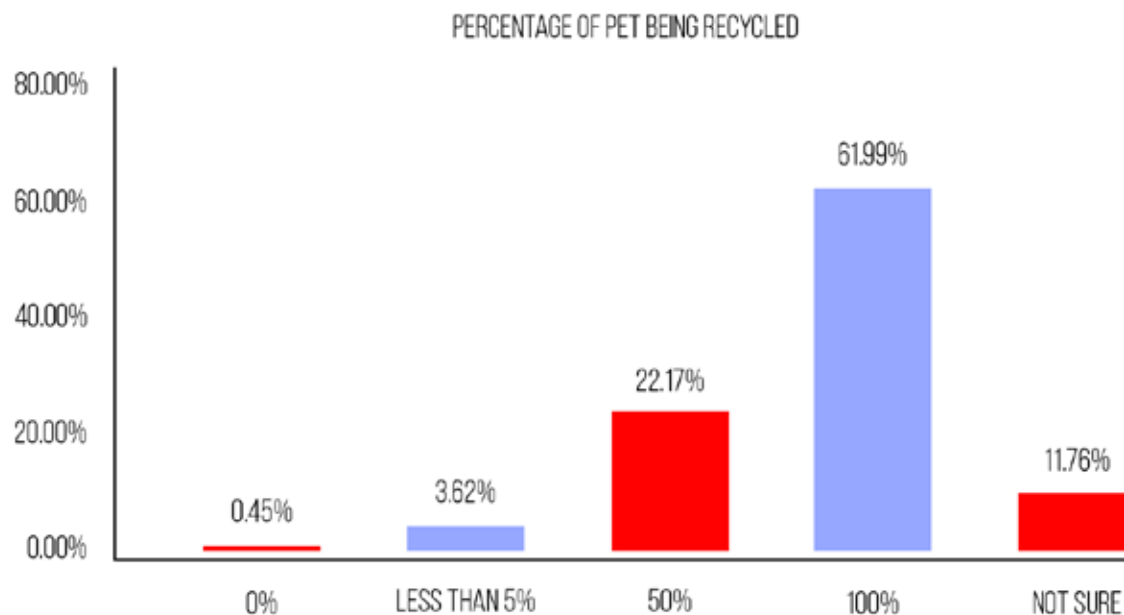
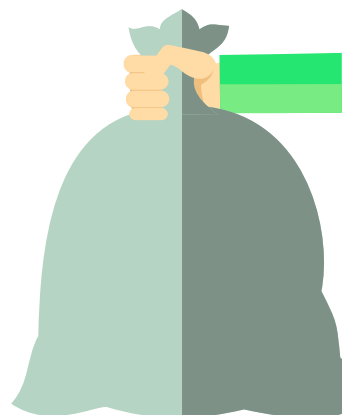
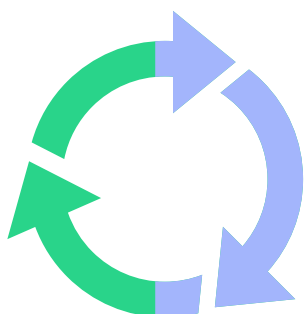


Figure 204: Percentage of PET being recycled according to stakeholders of PET supply chain

Scavengers, waste management companies, recyclers and junk dealers are key players in the collection, recovery and recycling of PET waste. Recognizing their relevance in the supply chain, it was imperative to take their views in to account when estimating the quantity of PET waste being recycled. Figure 204 shows that 100 percent of PET is recycled, which was reported by 62 percent of stakeholders in the PET supply chain. About 22 percent of respondents stated that 50 percent of PET is recycled. About 11 percent were not sure of the quantities of PET being recycled, while only a meagre four percent of stakeholders stated that less than five percent of PET was recycled. In conclusion, a total of 87 percent respondents based on their experience of PET waste collection, distribution, buying and selling stated that PET is being recycled.

Almost 62 % of respondents claim that 100 % of PET is recycled in the supply chain. About 22 % of respondents stated that 50 % of PET is being recycled.



62 % reported that 100 % of PET is recycled.

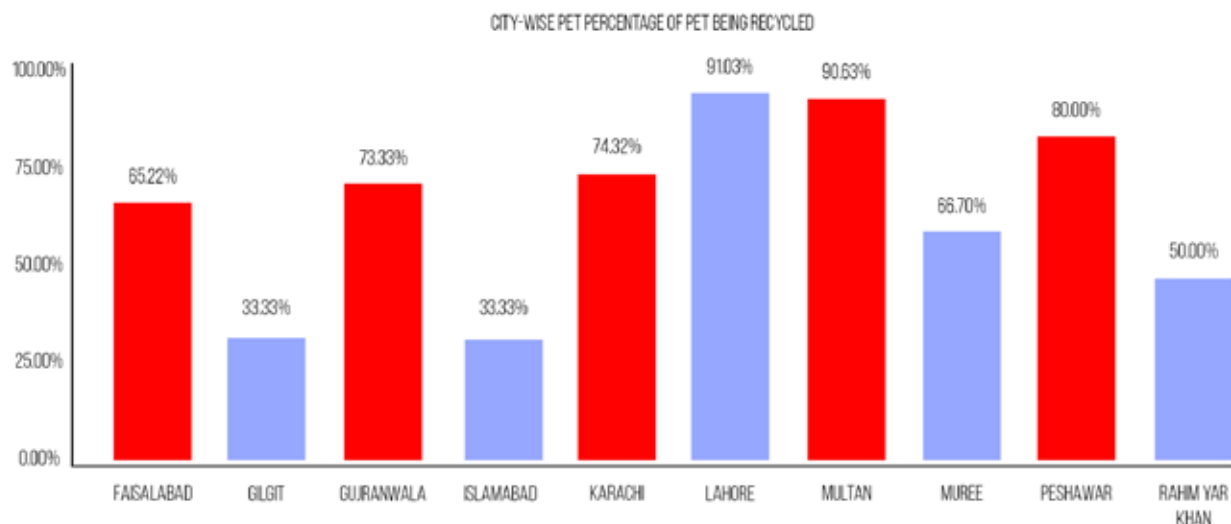


Figure 205: City-wise percentage of PET being recycled according to stakeholders in supply chain

Figure 205 shows city-wise PET recycling in the selected cities of Pakistan. Stakeholders in the PET supply chain of Multan indicate that 91 per cent of PET is recycled. Respondents in the supply chain provided this value based on years of experience and a well-established door-to-door system for collection and segregation of waste, which was in place well before the establishment of Multan Waste Management Company (MWMC). The main plastic industrial hubs are based in the major cities of Pakistan, as stated by stakeholders involved in the PET supply chain. Respondents in Lahore claimed that 91 percent of PET was recycled, while Peshawar represents an 80 percent PET recycling rate. Data from Karachi shows that 74 percent of PET is being recycled.

Moreover, data obtained from Gujranwala shows that 73 percent of PET is being recycled and Faisalabad represents a recycling rate of approximately 65 percent of PET, according to the stakeholders interviewed. These five cities have industries producing a variety of recycled plastic products that are used all over the country. In Gilgit, respondents stated that 33 percent of PET is recycled, which was the same as Islamabad. This is because the recycling industry is not well-established in these two cities. Lastly, Rahim Yar Khan's stakeholders involved in the PET supply chain stated that only 50 percent of PET waste was being recycled because most of the PET collected is directly sent to Lahore for recycling.



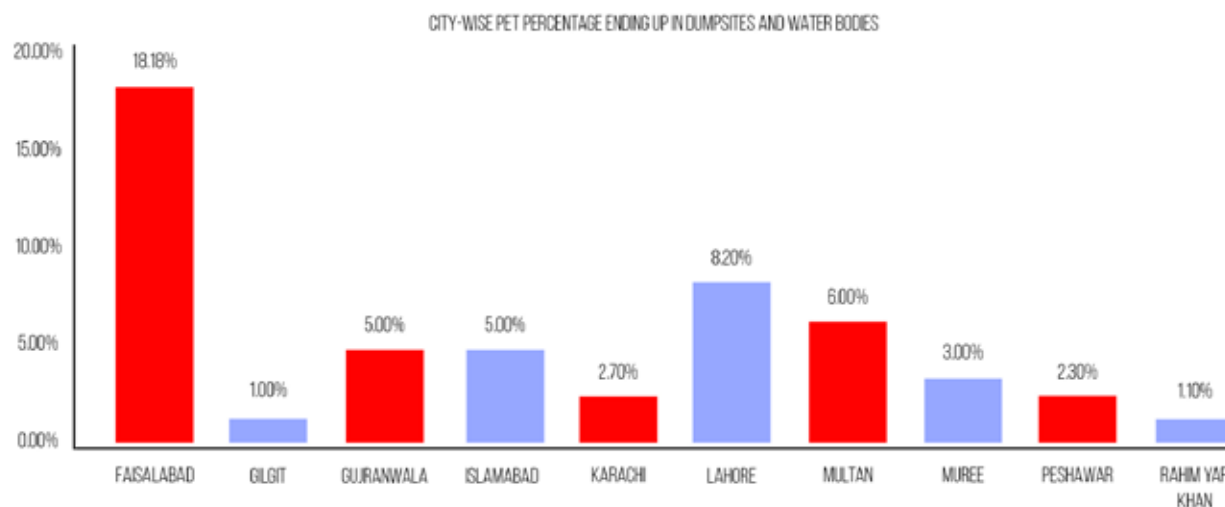


Figure 206: City-wise PET percentage ending up in dumpsites and water bodies according to stakeholders in PET supply chain

Figure 206 represents the percentage of PET that ends up in dumpsites and water bodies based on responses from stakeholders involved in the PET supply chain. The stakeholders in Faisalabad reported that 18 percent of PET ends up in dumpsites. This is because, according to scavengers in Faisalabad, the PET was acquired only from the surface of the waste heaps and was not extracted from under the piles. Gilgit and Rahim Yar Khan's stakeholders provide a figure of one percent, while Peshawar's stakeholders indicate that two percent of PET ends up in dumpsites and water bodies. Murree and Karachi's stakeholders suggest that around three percent of PET waste is dumped openly and is not collected.

Stakeholders in the PET supply chain in Gujranwala and Islamabad reported that five percent of PET is dumped in water bodies and open spaces. This small percentage consists mostly of PET that was inaccessible to scavengers and hence remained in the waste. In Multan, six percent of PET ends up in open dumps despite the existence of a strong supply chain network of scavengers because the waste that MWMC collects is segregated by very few scavengers. Eight percent of PET is still ending up in open dumps and drains in the city of Lahore as reported by stakeholders in the PET supply chain. This is due to the fact that some citizens directly dump their household waste into open drains and also because the designated dumping site in Lakhodair

is near full capacity, containing mountains of waste already. Hence, even if scavengers scour through the entire area, some PET waste will still be left behind as they can't access the depth of the piles.

The study results show that households and the commercial sector including restaurants and hotels recognised plastic pollution as a problem, but were unaware of the recycling and sustainable waste management practices. Households, in general, were not sorting recyclables at source, which was preventing an efficient PET waste recovery and recycling system. Through the study, the process of the PET bottle supply chain was identified along with the challenges of the informal recycling sector, which were addressed by developing an innovative solution such as the plastic recovery facility deployed in a densely populated area, to involve citizens in improving the efficient collection of PET. This study served as a baseline for the consumption, collection, recycling and disposal of PET; thus laying a road map to formalize the PET supply chain and making its collection effective, addressing associated challenges and strengthening its recycling. As a result, this study will serve as a foundation to develop future policies to address the issue of plastic pollution.



7. STUDY CONSTRAINTS

There were numerous constraints that hindered work on various occasions over the course of the study. Informal waste collectors were mostly unregistered and widely spread out, which made it difficult to access and establish contact. Also, it was challenging to get the questionnaires filled from them since they were extremely reluctant to disclose any information on PET waste being sold and bought. In many cases, these informal waste collectors assumed that the researchers were government officials inquiring about their activities. This is indicative of a general lack of trust waste pickers have towards state institutions because of their status as undocumented individuals. Another major reason for non-disclosure of information by scavengers was that they worked under the undue influence of their contractors and were wary of giving away any information or interacting for too long with researchers, for fear that they would get in trouble or would be laid off as a result.

Also, it was not possible to assess the total number of recyclers, scavengers and junk dealers present in all 10 scope cities; as a result, only estimated values for the total amount of PET being generated, collected and recycled could be ascertained. Similarly, the total number of restaurants and hotels couldn't be gauged since there are a lot of small-scale entities which are unregistered and unaccounted for. Due to time constraint, all of them could not be approached. Some restaurants in Multan also refused to accommodate the researchers for interviews because of the Ramzan break.

Additionally, in the study, owing to their abundance, only scavengers were assumed to be the sole PET collectors in the waste supply chain. In reality, however, on some occasions, the janitorial staff of hotels, restaurants, institutions and even some households, were noted to supply PET waste to junk dealers. Moreover, waste management companies' operational staff was also observed to pick out PET from waste trucks while unloading.

Accessibility to open dumps was not possible without WMC's prior approval, which is why on some occasions, time was lost getting the required approvals and coordinating with the schedule given by the authorities. Another difficult task was finding certified recyclers, who were actively involved in effective ways of recycling waste/PET; most of the recyclers were only limited to acquiring, crushing and exporting PET.

There were some natural time constraints as well: visits to institutes were conducted in April 2019 and this was when many students had final examinations; some universities and colleges were closed due to Ramzan holidays in May 2019 and others already had their summer holidays, which made it difficult to set up meetings. In the same manner, in Gilgit, field visits could not start early because the weather from January to April is not suitable for conducting surveys.

On a few occasions, institutional complications within stakeholders from the formal sector also hindered the progress of the project. For instance, because Multan Waste Management Company was a newly established entity, their service jurisdiction was very limited. In the same manner, Lahore Waste Management Company went on strikes for two weeks; Tehsil Municipal Administration (TMA) in Rahim Yar Khan went on strike on the day of the meeting.



8. RECOMMENDATIONS

In light of the challenges that exist within the waste management system, which were observed through the baseline study, the following recommendations are proposed:

INTEGRATING SCAVENGERS INTO A FORMAL SUPPLY CHAIN

Since scavengers play an integral role in the collection of recyclables, their formalization will help ensure that plastic waste is incorporated into a circular system. The establishment of a registration system specifically designed for informal waste pickers will alleviate social issues such as child labour and the exclusion of marginalized communities, thereby providing economic opportunities and reducing the trust deficit.

CAPACITY BUILDING OF THE INFORMAL SECTOR

A systematic training programme can be set up for scavengers and junk dealers to impart knowledge on best practices for waste collection and recycling with occupational health and safety at its core. This will improve the efficiency of their work as well as ensure a higher quality of life.

COLLABORATION BETWEEN CORPORATIONS AND RECYCLERS

A consortium between corporations and large and small-scale recyclers should be created. This will ascertain that recycled products are manufactured from responsibly sourced raw materials. Bridging the gap between distributors and recyclers will stabilize the supply and demand of plastics.

CENTRALIZED PLASTIC RECOVERY SYSTEM

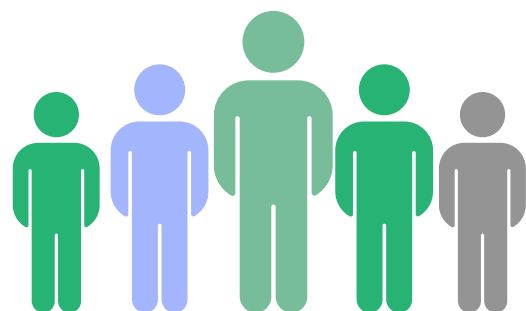
Plastic recovery facilities should be established in major cities of the country by Fast Moving Consumer Goods (FMCG) companies to improve recovery of used plastic bottles. This will also inculcate behavioural changes within consumers about responsible disposal.

FUTURE RESEARCH OPPORTUNITIES

Additional research needs to be carried out and it should be socially inclusive and studies ought to be conducted in all provinces of Pakistan. This will create a more holistic picture of the plastic waste management system as it persists today and lay the foundation for a centralized recycling system in the future.

CREATING PUBLIC AWARENESS

Awareness on plastic pollution through print and electronic media should be created to inform citizens about the implications of their irresponsible disposal. Ways to improve segregation at source should also be communicated to induce behavioural change in the population. This can be done through capacity building sessions. Periodic social media campaigns can also be part of CSR activities so citizens are encouraged to play their role in curbing plastic pollution.



ANNEXURE - I

COMMERCIAL COMMUNITY QUESTIONNAIRE

General Information

Name: _____ City: _____

Commercial Sector:

- ☐ Institutions ☐ Hotels
☐ Restaurants

Name of Restaurant/Hotel/Institution: _____

Disposal Patterns

1. Does your waste contain used plastic bottles?

- ☐ Yes ☐ No

2. How many plastic bottles do you use per month?

- ☐ Less than 20 kg ☐ Between 20 and 50 kg
☐ 50 to 100 kg ☐ 100 to 1000 kg
☐ 1000 to 2000 kg ☐ more than 2000kg

3. Do you segregate your waste?

- ☐ Yes ☐ No

4. If yes, do you sell plastic bottles to junk dealers?

- ☐ Yes ☐ No

5. Do you think that plastic waste is causing pollution on land and water?

- ☐ Yes ☐ No ☐ Unaware

6. If yes, why do you think plastics are harmful?

- ☐ They are carcinogenic
☐ They cause marine pollution
☐ They are a source of micro plastic litter

- ☐ They cause air pollution due to burning
☐ All of the above
☐ None of the above
☐ Not sure

7. Would you be willing to supply your plastic bottles and plastic bags to a plastic collection center?

- ☐ Yes ☐ No

8. Who are the main collectors of plastic bottle waste from you?

- ☐ Scavengers ☐ Recyclers
☐ Government waste management Companies
☐ Private collectors

9. In your opinion, what percentage of plastic bottles are being recycled?

- ☐ 0% ☐ Less than 5% ☐ 50%
☐ 100% ☐ Not sure

10. According to your understanding, what percentage of plastic bottles are going to the dumpsite/landfill?

- ☐ 0% ☐ Less than 5% ☐ 50%
☐ 100% ☐ Not sure

COMMERCIAL COMMUNITY QUESTIONNAIRE

General Information

Name: _____ City: _____
Area of residence: _____

Disposal Patterns

1. What does your household plastic waste mainly constitute of?

- ☐ Plastic bottles ☐ Plastic bags
☐ Polystyrene ☐ Other plastic items

2. Who is your household waste collector?

- ☐ Scavenger
☐ Waste Management Company
☐ No one
☐ Private or society's collector

3. How many plastic bottles do you use per month?

- ☐ Less than 10 bottles
☐ Between 10 and 30 bottles
☐ 30 to 50 bottles
☐ More than 50 bottles

4. Do you sell plastic bottles to junk dealers?

- ☐ Yes ☐ No

5. Do you think that plastic waste is causing pollution on land and water?

- ☐ Yes ☐ No

6. If yes, why do you think plastics are harmful?

- ☐ It's carcinogenic
☐ Plastics cause marine pollution
☐ They are a source of micro plastic litter
☐ They cause air pollution due to burning
☐ None of the above
☐ All of the above
☐ Not sure

7. Would you be willing to supply your plastic bottles and plastic bags to a plastic collection facility?

- ☐ Yes ☐ No

8. In your opinion, what percentage of plastic bottles are being recycled?

- ☐ 0% ☐ Less than 5%
☐ 50% ☐ 100% ☐ Not sure

9. According to your understanding, what percentage of plastic bottles are going to the dumpsite?

- ☐ 0% ☐ Less than 5%
☐ 50% ☐ 100% ☐ Not sure

FORMAL SECTOR/WASTE MANAGEMENT COMPANY QUESTIONNAIRE

General Information

Company name:

City:

Address:

Owner:

Contact no:

1. How much waste do you collect on a monthly basis (tonnes/month)?

☐ Less than 25000 ☐ 25000-50000

☐ 50000-150000 ☐ More than 150000

2. What is the percentage of waste collection efficiency?

☐ Below 25% ☐ 50% ☐ 70%

☐ 60% ☐ between 80%-100%

3. What issues prevent you from segregating the waste that is collected?

☐ Finance

☐ Human Resource

☐ Transportation and Equipment

☐ Technology

☐ Others

☐ Government willingness

☐ No community participation

☐ Lack of awareness

☐ No proper waste supply chains

4. What percentage of pet waste is being recycled according to others?

☐ Less than 20% ☐ 30% ☐ 50%

☐ 80% ☐ 100%

5. Who is the main collector of PET bottle waste?

☐ Scavengers

☐ Recyclers

☐ Waste Management Companies

☐ Private collectors

6. Do you think that plastic waste is causing pollution on land and water?

☐ Yes ☐ No

7. If yes, why do you think plastics are harmful?

☐ It's carcinogenic

☐ Plastics cause marine pollution

☐ They are a source of micro plastic litter

☐ They cause air pollution due to burning

☐ All of the above

☐ None of the above

☐ Not sure

8. Would you be willing to supply your plastic bottles and plastic bags to a plastic collection facility?

☐ Yes ☐ No

9. In your opinion, what percentage of plastic bottles are being recycled?

☐ 0% ☐ Less than 5% ☐ 50%

☐ 100% ☐ Not sure

10. According to your understanding, what percentage of plastic bottles are going to the dumpsite?

☐ 0% ☐ Less than 5% ☐ 50%

☐ 100% ☐ Not sure

JUNK DEALERS QUESTIONNAIRE

General Information

Shop name: _____ City: _____
Address: _____ Owner: _____
Contact no: _____

1. What is the most common type of plastic bought/sold?

| |
|--|
| <input type="checkbox"/> PET bottles |
| <input type="checkbox"/> Styrofoam |
| <input type="checkbox"/> Medical waste |
| <input type="checkbox"/> E-waste |
| <input type="checkbox"/> Others |
| <input type="checkbox"/> PVC |
| <input type="checkbox"/> Industrial |
| <input type="checkbox"/> Cutlery |
| <input type="checkbox"/> Plastic bags |

2. How much PET do others buy per month?

- | | |
|---|--|
| <input type="checkbox"/> Less than 20 kg | <input type="checkbox"/> 20 to 50kg |
| <input type="checkbox"/> 50kg to 100 kg | <input type="checkbox"/> More than 100kg |
| <input type="checkbox"/> 1000 kg to 500kg | |
| <input type="checkbox"/> More than 500 kg | |

3. How much PET do you sell per month?

- | | |
|---|---|
| <input type="checkbox"/> Less than 20 kg | <input type="checkbox"/> 20 to 50kg |
| <input type="checkbox"/> 50kg to 100 kg | <input type="checkbox"/> More than 100 kg |
| <input type="checkbox"/> 50 kg to 500kg | |
| <input type="checkbox"/> More than 500 kg | |

4. Do you buy PET separately or with other waste materials?

- ☐ Separately
☐ With other waste materials

5. Why don't you buy it separately?

- ☐ It's cheaper to buy it with mixed waste
☐ It doesn't come separately
☐ Not applicable

6. Who are your PET suppliers?

a) Name: _____
Address: _____
Contact #: _____
Buying price/ton: _____

7. Who are your PET buyers?

a) Name: _____
Address: _____
Contact #: _____
Selling price/ton: _____

8. What is the cost of transporting plastic bottles to recyclers?

| |
|--|
| |
| |
| |
| |

9. Do you think that plastic waste is causing pollution on land and water?

- ☐ Yes ☐ No ☐ Unaware

10. If yes, why do you think plastics are harmful?

- ☐ It's a carcinogenic
☐ Marine pollution
☐ Micro plastic litter
☐ It causes air pollution due to burning
☐ All of the above
☐ None of the above
☐ Not sure

11. Would you be willing to supply your plastic bottles and plastic bags to a plastic bank?

- ☐ Yes ☐ No

12. In your opinion, what percentage of plastic bottles are being recycled?

- ☐ 0% ☐ Less than 5% ☐ Not sure
☐ 50% ☐ 100%

13. According to your understanding, what percentage of plastic bottles are going to the dumpsite?

- ☐ 0% ☐ Less than 5% ☐ Not sure
☐ 50% ☐ 100%

RECYCLERS QUESTIONNAIRE

General Information

Company name:

City:

Address:

Owner:

Contact no:

1. What type of plastic waste do you take?

☐ PET bottles

☒ Styrofoam

☐ Medical waste

☒ E-waste

☐ Others

☐ PVC

☐ Industrial

☐ Cutlery

☒ Plastic bags

2. What quantity of PET bottles do others take monthly (tonnes/month)?

☐ Less than 50

☐ 50-100

☐ 100-500

☐ 500-1000

☐ 1000- 2000

☐ 2000 ton and above

3. What is your monthly plastic product production (tons/month)?

☐ Less than 50

☐ 50- 500

☐ 500-1000

☐ 1000-2000

☐ 2000 tons and above

4. What is the type of recycled plastic you produce?

☐ Resins

☒ Pellets

☐ Fiber

☒ Crockery

☐ Medical equipment

☒ Bottles

☐ Others

5. What do you do with the unusable PET waste?

☐ Open dumping

☐ Burning

☐ Reuse as it is

☐ Brick kilns

6. Who are your main suppliers?

a) Name:

Address:

Contact #:

Buying price/ton:

b) Name:

Address:

Contact #:

Buying price/ton:

7. Whom do you sell your recycled product to?

a) Name:

Address:

Contact #:

Selling price/ton:

b) Name:

Address:

Contact #:

Selling price/ton:

8. What is the overall cost of transportation while recycling PET?

9. What are some of the challenges do you face in recycling of PET bottles?

☐ Financial

☐ Price of PET

☐ Expensive Machinery

☐ Lack of training and awareness

☐ No Government Support

☐ Human resource mostly PET is exported

10. If provided with a steady supply, would you recycle PET to produce new PET products?

☐ Yes ☐ No

11. Do you think that plastic waste is causing pollution on land and water?

☐ Yes ☐ No ☐ Unaware

12. If yes, why do you think plastics are harmful?

- ☐ It's carcinogenic
- ☐ Plastics cause marine pollution
- ☐ They are a source of micro plastic litter
- ☐ They cause air pollution due to burning
- ☐ All of the above
- ☐ None of the above
- ☐ Not sure

13. Who is the main supplier of pet bottle waste?

- ☐ Scavengers ☐ Recyclers
- ☐ Government WMCs ☐ Private collectors

14. In your opinion, what percentage of plastic bottles are being recycled?

- ☐ 0% ☐ Less than 5%
- ☐ 50% ☐ 100% ☐ Not sure

15. According to your understanding, what percentage of plastic bottles are going to the dumpsite?

- ☐ 0% ☐ Less than 5%
- ☐ 50% ☐ 100% ☐ Not sure

SCAVENGERS/INFORMAL SECTOR QUESTIONNAIRE

General Information

Company name:

City:

Address:

Owner:

Contact no:

1. What type of waste do you collect?
(Check all that apply)

☐ PET bottles

☐ Styrofoam

☐ Medical waste

☐ E-waste

☐ Others

☐ PVC

☐ Industrial

☐ Cutlery

☐ Plastic bags

2. Where do you collect PET from?

☐ Residential Area

☐ Commercial Area

☐ Medical Care Centers

☐ Open dumps

☐ Beaches

☐ Others (Please specify)

3. Which localities do you collect waste from?

a) Name:

Address:

b) Name:

Address:

c) Name:

Address:

4. What is your frequency of segregating the PET from collected waste?

☐ Daily

☐ Weekly

☐ Monthly

☐ Other (Please specify)

5. How much quantity of PET do you collect? (kg/day)

☐ 1 to 5

☐ 5 to 20

☐ 20 to 50

☐ 50 to 100

☐ More than 100

6. How much PET do you sell? (kg/day)

☐ 1 to 5

☐ 5 to 20

☐ 20 to 50

☐ 50 to 100

☐ More than 100

7. What do you do with the unsellable waste?

☐ Open dumping

☐ Burning

☐ Reuse as it is

☐ Brick kilns

8. Who are your PET buyers?

a) Name:

Address:

Contact #:

Selling price/ton:

b) Name:

Address:

Contact #

Selling price/ton:

c) Name:

Address:

Contact #:

Selling price/ton:

9. What are the challenges you face while collecting PET?

☐ No personal protective equipment

☐ health is impaired

☐ No proper collection equipment or tools

☐ No Government Support competitive

☐ collectors-big companies/scavengers

☐ No acceptance in formal job market of waste

10. Do you think that plastic waste is causing pollution on land and water?

☐ Yes

☐ No

☐ Unaware

11. If yes, why do you think plastics are harmful?

- ☐ It's carcinogenic
- ☐ Plastics cause marine pollution
- ☐ They are a source of micro plastic litter
- ☐ They cause air pollution due to burning
- ☐ All of the above
- ☐ None of the above
- ☐ Not sure

12. Would you be willing to supply your plastic bottles and plastic bags to a plastic bank?

- ☐ Yes ☐ No

13. In your opinion, what percentage of plastic bottles are being recycled?

- ☐ 0% ☐ Less than 5%
☐ 50% ☐ 100% ☐ Not sure

14. According to your understanding, what percentage of plastic bottles are going to the dumpsite?

- ☐ 0% ☐ Less than 5%
☐ 50% ☐ 100% ☐ Not sure

ANNEXURE - II

LIST OF SURVEY FACILITATORS

INSTITUTES

List of Educational Institutes covered

LAHORE

Lahore University of Management Sciences (LUMS)
University of Engineering & Technology (UET)
Government College University (GCU)
Lahore College for Women University (LCWU)
Kinnaird College for Women University (KCWU)
NUCES Fast University
Lahore Grammar School (LGS)

ISLAMABAD

National University of Sciences and Technology (NUST)
COMSATS University Islamabad
Air University (AU)
Bahria University
The Horizon High School

KARACHI

Pak Turk International School & Colleges
Shahwilayat Public School
Beaconhouse Primary School
The City School
The American Foundation School
The Smart School Campus
Foundation Public School
The Millennium University College





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FAISALABAD

Government College University Faisalabad

GUJRANWALA

GIFT University
Chenab College of Engineering & Technology

MULTAN

Bahauddin Zakariya University (BZU)
Government College of Technology (GCT)
Muhammad Nawaz Shareef University of
Agriculture (MNSUAM)

MURREE

Lawrence College
PAF College Lower Topa
St Denys High School
University of Engineering & Technology

PESHAWAR

Peshawar Islamia College University
Khyber Medical College
University of Agriculture (UAF)
University of Peshawar (UoP)

RAHIM YAR KHAN

Khawaja Fareed University of Engineering &
Information Technology (KFUEIT)
National College of Business Administration
and Economics (NCBA&E)
Sheikh Zayed Medical College (SZMC)
Gilgit Karakoram International University
(KIU)
Falcon School and Degree College

HOTELS

List of Hotels covered

LAHORE

Faletti's Hotel
Lahore Continental Hotel
Pearl Continental Hotel

ISLAMABAD

Ramada Islamabad
Serena Hotel
Hill View Hotel
Marriott Hotel

KARACHI

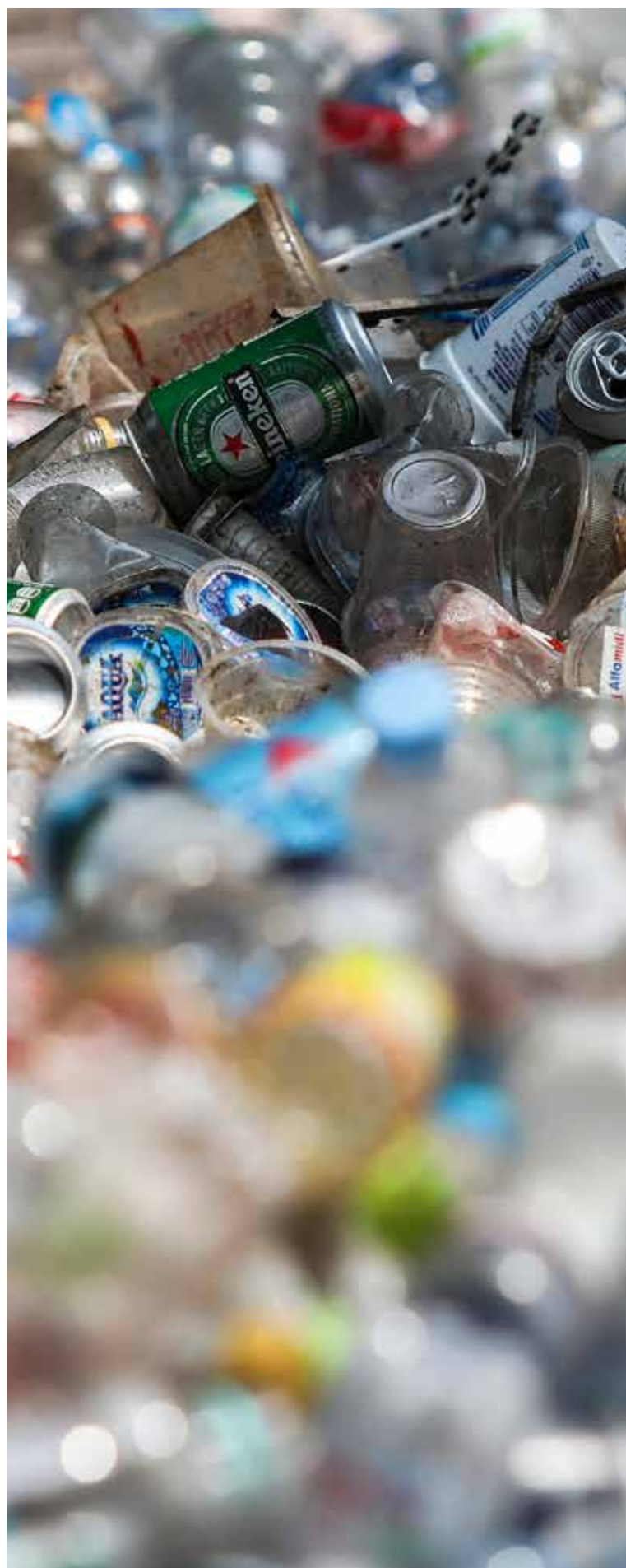
Pearl Continental Hotel
Avari Towers
Ramada Plaza
Mövenpick Hotels & Resorts
Regent Plaza Hotel
Beach Luxury Hotel

FAISALABAD

Avari Xpress Hotel
Serena Hotels
Royalton Hotel
Hotel One
Gujranwala Shelton Hotel
Aleena Hotel

MULTAN

Avari Xpress Hotel
Hotel Ramada
Bling Hotel





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MURREE

Shangrilla Resort Hotel
Blue Pine Hotel, Murree
Hotel One
Hotel Taj Mahal
Al-Qamar Hotel
Move-n-Pick Murree
Maisonette Firhill Murree
Peshawar Shelton's Rezidor
Hotel Grand

RAHIM YAR KHAN

Hotel One
Lamis Hotel
Desert Palm Hotel

RESTAURANTS

List of Restaurants covered

LAHORE

Mouthful Café
Freddy's Cafe
Salt 'n' Pepper
Bamboo Union
Eataly
The Pantry

ISLAMABAD

Ox And Grill
Kabul Restaurant
Wild Wings
Cocochan
Pizza Hut

KARACHI

Hardee's
Great Wall
Del Frio
Kaybees Snacks & Restaurant
La Terrasse
Subway
Lal's Patisserie
Bella Vita
Mocca Coffee Shop
KBC
Peri Peri Originals
Alen's Grilled and Fried Chicken
EatOut
Nando's
California Pizza
Rosati Bistro
Pizza Max
Burger Planet

FAISALABAD

Fine Club Restaurant
Almaida Pizza Garden
Golden Flame Restaurant
CoCo Black Cafe & restaurants
Chicken Broast
Dynasty Restaurant

GUJRANWALA

Uptown Lounge
Foodie
Yemek Doner
Wingos Restaurant
Flame Game

MULTAN

Chaaye Khana
London Courtyard
X2 Restaurant
Pizza Hut
Shahjahan grill
V China





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Pizza Max
Bling Hotel

MURREE

Fine Club Restaurant
Almaida Pizza Garden
Golden Flame Restaurant
CoCo Black Cafe & Restaurants
Chicken Broast
Dynasty Restaurant

MURREE

Lahore Broast, Murree
Usmania Restaurant and Hotel
Marhaba Hotel & Restaurant
Red Onion
Tabaq Restaurant
Lintott's Restaurant
White Onion

PESHAWAR

Charsi Tikka
Cone Heads
Thames burger
Jan's Deli
Chief Grill

RAHIM YAR KHAN

Safari
Cafe Lamis Hotel & Restaurant
Pizza Town
Paprika Restaurant

GILGIT

Festive Hotel and Restaurant
Peshawar Tikka Shop
GB Palace and Restaurant
Ramadan Hotel and Restaurant



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1970

WWF-Pakistan came into being in 1970, and has been working to conserve Pakistan's natural resources ever since.

300+

The organization works through over 30 offices, including five regional offices, and a team of over 300 dedicated staff members.



FUTURE GENERATIONS

Our greatest responsibility is to lead the way in conserving Pakistan's rich natural diversity so that future generations can continue to benefit from them.

GLOBAL GOALS

WWF-Pakistan carries out conservation work according to six global goals which includes wildlife, oceans, freshwater, food, forest, climate and alternate energy.



Working to sustain the natural world for the benefit of people and wildlife.

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