New code on cholera analysis\_20250405

Selemani Ngwira

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## Loading required package: pacman

## [conflicted] Will prefer dplyr::filter over any other package.  
## [conflicted] Will prefer flextable::align over any other package.

# loading data

## Reading layer `MWI\_adm1' from data source   
## `C:\Users\Lenovo\OneDrive\Desktop\Git R project\R\_Projects\Cholera\_study\_project\_2024\data\MWI\_adm1.shp'   
## using driver `ESRI Shapefile'  
## Simple feature collection with 28 features and 9 fields  
## Geometry type: MULTIPOLYGON  
## Dimension: XY  
## Bounding box: xmin: 32.67152 ymin: -17.12721 xmax: 35.91505 ymax: -9.363796  
## Geodetic CRS: WGS 84

# Social and behavioral factors that influence current water treatment.

## Houshold awareness of the Health Risk Associated with drinking untreated Water by Sex, Age-Group, Level of Education, and Ethnicity

| **Characteristic** | **no** N = 79*1* | **yes** N = 716*1* |
| --- | --- | --- |
| sex |  |  |
| female | 56 (9.2%) | 551 (90.8%) |
| male | 23 (12.2%) | 165 (87.8%) |
| age\_group |  |  |
| >50 | 12 (6.9%) | 162 (93.1%) |
| 18-30 | 39 (13.5%) | 250 (86.5%) |
| 31-50 | 28 (8.4%) | 304 (91.6%) |
| level\_education |  |  |
| none | 16 (14.8%) | 92 (85.2%) |
| primary | 57 (11.4%) | 442 (88.6%) |
| secondary | 6 (3.5%) | 164 (96.5%) |
| tertiary | 0 (0.0%) | 18 (100.0%) |
| ethnicity |  |  |
| chewa | 40 (10.2%) | 352 (89.8%) |
| lomwe | 7 (10.8%) | 58 (89.2%) |
| ngonde | 1 (25.0%) | 3 (75.0%) |
| ngoni | 6 (5.9%) | 95 (94.1%) |
| nyanja | 3 (21.4%) | 11 (78.6%) |
| other\_enthni | 1 (11.1%) | 8 (88.9%) |
| sena | 0 (0.0%) | 3 (100.0%) |
| tonga | 2 (8.3%) | 22 (91.7%) |
| tumbuka | 0 (0.0%) | 11 (100.0%) |
| yao | 19 (11.0%) | 153 (89.0%) |
| *1*n (%) | | |

## Houshold awareness of the Health Risk Associated with drinking untreated Water by District and Residence

| **Characteristic** | **no** N = 79*1* | **yes** N = 716*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 3 (8.8%) | 31 (91.2%) |
| Blantyre | 12 (9.2%) | 118 (90.8%) |
| Dedza | 8 (7.6%) | 97 (92.4%) |
| Lilongwe | 35 (11.7%) | 265 (88.3%) |
| Mangochi | 16 (12.4%) | 113 (87.6%) |
| Nkhatabay | 3 (8.3%) | 33 (91.7%) |
| Salima | 2 (3.3%) | 59 (96.7%) |
| residence |  |  |
| In land | 55 (10.3%) | 480 (89.7%) |
| lake shore | 24 (9.2%) | 236 (90.8%) |
| *1*n (%) | | |

### 2.3. 0 Main sources of drinking water during the dry season by District and Residence

| district | borehole | community standpipe | piped into dwelling | piped into yard plot | protected well | unprotected well | other drinking source | river stream | spring | dam | bottled water | tanker truck bower | lake |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| character | character | character | character | character | character | character | character | character | character | character | character | character | character |
| Balaka | 34 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Blantyre | 97 (74.6%) | 6 (4.6%) | 14 (10.8%) | 9 (6.9%) | 1 (0.8%) | 3 (2.3%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dedza | 85 (81%) | 2 (1.9%) | 1 (0.9%) | 2 (1.9%) | 5 (4.8%) | 7 (6.7%) | 1 (0.9%) | 1 (0.9%) | 1 (0.9%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Lilongwe | 247 (82.3%) | 2 (0.7%) | 2 (0.7%) | 8 (2.7%) | 22 (7.3%) | 7 (2.3%) | 0 (0%) | 7 (2.3%) | 0 (0%) | 5 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Mangochi | 112 (86.8%) | 3 (2.3%) | 2 (1.6%) | 7 (5.4%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (1.6%) | 3 (2.3%) | 0 (0%) |
| Nkhatabay | 14 (38.9%) | 2 (5.6%) | 3 (8.3%) | 11 (30.6%) | 1 (2.8%) | 0 (0%) | 1 (2.8%) | 2 (5.6%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (5.6%) |
| Salima | 54 (88.5%) | 1 (1.6%) | 0 (0%) | 5 (8.2%) | 1 (1.6%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| n: 7 | | | | | | | | | | | | | |

| residence | borehole | community standpipe | dam | other drinking source | piped into dwelling | piped into yard plot | protected well | river stream | spring | unprotected well | bottled water | lake | tanker truck bower |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| character | character | character | character | character | character | character | character | character | character | character | character | character | character |
| In land | 429 (80.2%) | 10 (1.9%) | 5 (0%) | 1 (0.2%) | 17 (3.2%) | 19 (3.5%) | 28 (5.2%) | 8 (1.5%) | 1 (0.2%) | 17 (3.2%) | 0 (0%) | 0 (0%) | 0 (0%) |
| lake shore | 214 (82.3%) | 6 (2.3%) | 0 (0%) | 1 (0.4%) | 5 (1.9%) | 23 (8.8%) | 2 (0.8%) | 2 (0.8%) | 0 (0%) | 0 (0%) | 2 (0.8%) | 2 (0.8%) | 3 (1.1%) |
| n: 2 | | | | | | | | | | | | | |

## 2.4. 0 Main sources of drinking water during the wet season by District

| district | borehole | community standpipe | dam | lake | piped into dwelling | piped into yard plot | protected well | rainwater | unprotected well | other drinking source | spring | river stream | tanker truck bower | bottled water |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| character | character | character | character | character | character | character | character | integer | character | character | character | character | character | character |
| Balaka | 34 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Blantyre | 94 (72.3%) | 5 (3.9%) | 1 (0%) | 1 (0.8%) | 13 (10%) | 6 (4.6%) | 1 (0.8%) | 5 | 4 (3.1%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Dedza | 84 (80%) | 3 (2.9%) | 0 (0%) | 0 (0%) | 1 (0.9%) | 1 (0.9%) | 2 (1.9%) | 7 | 5 (4.8%) | 1 (0.9%) | 1 (0.9%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Lilongwe | 235 (78.3%) | 2 (0.7%) | 6 (0%) | 0 (0%) | 1 (0.3%) | 7 (2.3%) | 26 (8.7%) | 7 | 10 (3.3%) | 0 (0%) | 0 (0%) | 5 (1.7%) | 1 (0.3%) | 0 (0%) |
| Mangochi | 109 (84.5%) | 4 (3.1%) | 0 (0%) | 0 (0%) | 2 (1.6%) | 6 (4.7%) | 0 (0%) | 1 | 0 (0%) | 0 (0%) | 1 (0.8%) | 1 (0.8%) | 3 (2.3%) | 2 (1.6%) |
| Nkhatabay | 15 (41.7%) | 2 (5.6%) | 0 (0%) | 0 (0%) | 3 (8.3%) | 11 (30.6%) | 0 (0%) | 3 | 0 (0%) | 0 (0%) | 0 (0%) | 2 (5.6%) | 0 (0%) | 0 (0%) |
| Salima | 52 (85.2%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 7 (11.5%) | 1 (1.6%) | 1 | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| n: 7 | | | | | | | | | | | | | | |

| residence | borehole | community standpipe | dam | lake | other drinking source | piped into dwelling | piped into yard plot | protected well | rainwater | river stream | spring | tanker truck bower | unprotected well | bottled water |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| character | character | character | character | character | character | character | character | character | integer | character | character | character | character | character |
| In land | 413 (77.2%) | 10 (1.9%) | 7 (0%) | 1 (0.2%) | 1 (0.2%) | 15 (2.8%) | 14 (2.6%) | 29 (5.4%) | 19 | 5 (0.9%) | 1 (0.2%) | 1 (0.2%) | 19 (3.5%) | 0 (0%) |
| lake shore | 210 (80.8%) | 6 (2.3%) | 0 (0%) | 0 (0%) | 0 (0%) | 5 (1.9%) | 24 (9.2%) | 1 (0.4%) | 5 | 3 (1.1%) | 1 (0.4%) | 3 (1.1%) | 0 (0%) | 2 (0.8%) |
| n: 2 | | | | | | | | | | | | | | |

### 2.5.1 Water Treatment at Household by Sex, Level of Education, Religion

| **Characteristic** | **no** N = 299*1* | **yes** N = 496*1* |
| --- | --- | --- |
| sex |  |  |
| female | 209 (34.43%) | 398 (65.57%) |
| male | 90 (47.87%) | 98 (52.13%) |
| age\_group |  |  |
| >50 | 59 (33.91%) | 115 (66.09%) |
| 18-30 | 118 (40.83%) | 171 (59.17%) |
| 31-50 | 122 (36.75%) | 210 (63.25%) |
| level\_education |  |  |
| none | 52 (48.15%) | 56 (51.85%) |
| primary | 187 (37.47%) | 312 (62.53%) |
| secondary | 53 (31.18%) | 117 (68.82%) |
| tertiary | 7 (38.89%) | 11 (61.11%) |
| religion |  |  |
| Christianity | 231 (39.02%) | 361 (60.98%) |
| muslim | 54 (30.17%) | 125 (69.83%) |
| others\_regligion | 14 (58.33%) | 10 (41.67%) |
| ethnicity |  |  |
| chewa | 159 (41%) | 233 (59%) |
| lomwe | 26 (40%) | 39 (60%) |
| ngonde | 2 (50%) | 2 (50%) |
| ngoni | 39 (39%) | 62 (61%) |
| nyanja | 6 (43%) | 8 (57%) |
| other\_enthni | 1 (11%) | 8 (89%) |
| sena | 0 (0%) | 3 (100%) |
| tonga | 10 (42%) | 14 (58%) |
| tumbuka | 6 (55%) | 5 (45%) |
| yao | 50 (29%) | 122 (71%) |
| *1*n (%) | | |

### 2.5.2 Water Treatment at Household by District and Residence

| **Characteristic** | **no** N = 299*1* | **yes** N = 496*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 11 (32.35%) | 23 (67.65%) |
| Blantyre | 37 (28.46%) | 93 (71.54%) |
| Dedza | 58 (55.24%) | 47 (44.76%) |
| Lilongwe | 133 (44.33%) | 167 (55.67%) |
| Mangochi | 29 (22.48%) | 100 (77.52%) |
| Nkhatabay | 15 (41.67%) | 21 (58.33%) |
| Salima | 16 (26.23%) | 45 (73.77%) |
| residence |  |  |
| In land | 228 (42.62%) | 307 (57.38%) |
| lake shore | 71 (27.31%) | 189 (72.69%) |
| *1*n (%) | | |

### 2.5.1 yes, Methods of water treatment by District

for methods of water treatment, will filter out those who do not treat water. n(496)

## `summarise()` has grouped output by 'age\_group'. You can override using the  
## `.groups` argument.  
## `summarise()` has grouped output by 'sex'. You can override using the `.groups`  
## argument.  
## `summarise()` has grouped output by 'level\_education'. You can override using  
## the `.groups` argument.  
## `summarise()` has grouped output by 'religion'. You can override using the  
## `.groups` argument.

| Characterists | boiling | ceramic filter | filter with cloth | others methods | solar disinfection | stand settle | use chlorine | use water from tap |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| character | character | character | character | character | character | character | character | character |
| female | 76 (16.2%) | 2 (0.4%) | 23 (4.9%) | 39 (8.3%) | 1 (0.2%) | 8 (1.7%) | 308 (65.8%) | 11 (2.4%) |
| male | 31 (26%) | 0 (0%) | 6 (5%) | 4 (3.4%) | 1 (0.8%) | 7 (5.9%) | 68 (57.1%) | 2 (1.7%) |
| 18-30 | 36 (17.2%) | 2 (1%) | 13 (6.2%) | 21 (10.1%) | 0 (0%) | 7 (3.4%) | 124 (59.3%) | 6 (2.9%) |
| 31-50 | 45 (19%) | 0 (0%) | 10 (4.2%) | 12 (5.1%) | 1 (0.4%) | 4 (1.7%) | 162 (68.3%) | 3 (1.3%) |
| >50 | 26 (18.4%) | 0 (0%) | 6 (4.3%) | 10 (7.1%) | 1 (0.7%) | 4 (2.8%) | 90 (63.8%) | 4 (2.8%) |
| none | 6 (9.8%) | 0 (0%) | 4 (6.6%) | 0 (0%) | 0 (0%) | 0 (0%) | 49 (80.3%) | 2 (3.3%) |
| primary | 71 (18.9%) | 0 (0%) | 17 (4.5%) | 28 (7.5%) | 1 (0.3%) | 10 (2.7%) | 242 (64.5%) | 6 (1.6%) |
| secondary | 27 (19.7%) | 2 (1.5%) | 8 (5.8%) | 13 (9.5%) | 1 (0.7%) | 4 (2.9%) | 77 (56.2%) | 5 (3.6%) |
| tertiary | 3 (21.4%) | 0 (0%) | 0 (0%) | 2 (14.3%) | 0 (0%) | 1 (7.1%) | 8 (57.1%) | 0 (0%) |
| Christianity | 92 (21.1%) | 1 (0.2%) | 21 (4.8%) | 37 (8.5%) | 2 (0.5%) | 12 (2.8%) | 260 (59.6%) | 11 (2.5%) |
| n: 12 | | | | | | | | |

### 2.5.3 Methods of water treatment by District and Residence

for methods of water treatment, will filter out those who do not treat water. n(496)

### 2.5.4 Chlorination process by demographic variables.

We will filter out those who do not treat water, and who do not use for water treatment chlorination. (n=376)

| **Characteristic** | **no** N = 113*1* | **yes** N = 263*1* |
| --- | --- | --- |
| sex |  |  |
| female | 95 (30.8%) | 213 (69.2%) |
| male | 18 (26.5%) | 50 (73.5%) |
| age\_group |  |  |
| >50 | 31 (34.4%) | 59 (65.6%) |
| 18-30 | 32 (25.8%) | 92 (74.2%) |
| 31-50 | 50 (30.9%) | 112 (69.1%) |
| level\_education |  |  |
| none | 24 (49.0%) | 25 (51.0%) |
| primary | 69 (28.5%) | 173 (71.5%) |
| secondary | 18 (23.4%) | 59 (76.6%) |
| tertiary | 2 (25.0%) | 6 (75.0%) |
| religion |  |  |
| Christianity | 77 (29.6%) | 183 (70.4%) |
| muslim | 35 (31.5%) | 76 (68.5%) |
| others\_regligion | 1 (20.0%) | 4 (80.0%) |
| ethnicity |  |  |
| chewa | 55 (33%) | 112 (67%) |
| lomwe | 9 (32%) | 19 (68%) |
| ngonde | 0 (0%) | 1 (100%) |
| ngoni | 9 (19%) | 38 (81%) |
| nyanja | 3 (43%) | 4 (57%) |
| other\_enthni | 4 (80%) | 1 (20%) |
| sena | 0 (0%) | 3 (100%) |
| tonga | 1 (14%) | 6 (86%) |
| tumbuka | 0 (0%) | 2 (100%) |
| yao | 32 (29%) | 77 (71%) |
| *1*n (%) | | |

### 2.5.4 Chlorination process by district.

We will filter out those who do not treat water, and who do not use for water treatment chlorination. (n=376)

| **Characteristic** | **no** N = 113*1* | **yes** N = 263*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 4 (19.0%) | 17 (81.0%) |
| Blantyre | 24 (33.8%) | 47 (66.2%) |
| Dedza | 6 (20.0%) | 24 (80.0%) |
| Lilongwe | 43 (37.1%) | 73 (62.9%) |
| Mangochi | 23 (25.0%) | 69 (75.0%) |
| Nkhatabay | 1 (9.1%) | 10 (90.9%) |
| Salima | 12 (34.3%) | 23 (65.7%) |
| residence |  |  |
| In land | 73 (33.6%) | 144 (66.4%) |
| lake shore | 40 (25.2%) | 119 (74.8%) |
| *1*n (%) | | |

## 2.5. 5 Frequency of water treatment by Sex, Level of Education, Religion

## 2.5. 5 Frequency of water treatment by Place of Residence, and District

| **Characteristic** | **Always** N = 281*1* | **donot\_know** N = 3*1* | **Sometimes** N = 206*1* |
| --- | --- | --- | --- |
| district |  |  |  |
| Balaka | 15 (5.34%) | 0 (0.00%) | 8 (3.88%) |
| Blantyre | 53 (18.86%) | 0 (0.00%) | 38 (18.45%) |
| Dedza | 21 (7.47%) | 0 (0.00%) | 26 (12.62%) |
| Lilongwe | 95 (33.81%) | 1 (33.33%) | 69 (33.50%) |
| Mangochi | 61 (21.71%) | 2 (66.67%) | 37 (17.96%) |
| Nkhatabay | 12 (4.27%) | 0 (0.00%) | 8 (3.88%) |
| Salima | 24 (8.54%) | 0 (0.00%) | 20 (9.71%) |
| residence |  |  |  |
| In land | 169 (60.14%) | 1 (33.33%) | 133 (64.56%) |
| lake shore | 112 (39.86%) | 2 (66.67%) | 73 (35.44%) |
| *1*n (%) | | | |

## 2.5.6 Access to water treatment by demographic variables

Analysis of the water treatment products access by demographic variables. n(496), This has filtered out those who do not treat water.

| **Characteristic** | **no** N = 267*1* | **yes** N = 229*1* |
| --- | --- | --- |
| sex |  |  |
| female | 227 (57.0%) | 171 (43.0%) |
| male | 40 (40.8%) | 58 (59.2%) |
| age\_group |  |  |
| >50 | 55 (47.8%) | 60 (52.2%) |
| 18-30 | 93 (54.4%) | 78 (45.6%) |
| 31-50 | 119 (56.7%) | 91 (43.3%) |
| level\_education |  |  |
| none | 37 (66.1%) | 19 (33.9%) |
| primary | 159 (51.0%) | 153 (49.0%) |
| secondary | 64 (54.7%) | 53 (45.3%) |
| tertiary | 7 (63.6%) | 4 (36.4%) |
| religion |  |  |
| Christianity | 183 (50.7%) | 178 (49.3%) |
| muslim | 81 (64.8%) | 44 (35.2%) |
| others\_regligion | 3 (30.0%) | 7 (70.0%) |
| ethnicity |  |  |
| chewa | 118 (50.6%) | 115 (49.4%) |
| lomwe | 20 (51.3%) | 19 (48.7%) |
| ngonde | 1 (50.0%) | 1 (50.0%) |
| ngoni | 29 (46.8%) | 33 (53.2%) |
| nyanja | 6 (75.0%) | 2 (25.0%) |
| other\_enthni | 4 (50.0%) | 4 (50.0%) |
| sena | 1 (33.3%) | 2 (66.7%) |
| tonga | 5 (35.7%) | 9 (64.3%) |
| tumbuka | 3 (60.0%) | 2 (40.0%) |
| yao | 80 (65.6%) | 42 (34.4%) |
| *1*n (%) | | |

## 2. 5.6 Access to water treatment by district

on access to water treatment, we will filter out those who do not treat water. (n=496) this has filter out those do not treat water.

## 299 missing rows in the "difficulties\_accessing\_water\_treatment\_products"  
## column have been removed.

| **Characteristic** | **no** N = 267*1* | **yes** N = 229*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 14 (60.87%) | 9 (39.13%) |
| Blantyre | 47 (50.54%) | 46 (49.46%) |
| Dedza | 23 (48.94%) | 24 (51.06%) |
| Lilongwe | 88 (52.69%) | 79 (47.31%) |
| Mangochi | 63 (63.00%) | 37 (37.00%) |
| Nkhatabay | 9 (42.86%) | 12 (57.14%) |
| Salima | 23 (51.11%) | 22 (48.89%) |
| residence |  |  |
| In land | 158 (51.47%) | 149 (48.53%) |
| lake shore | 109 (57.67%) | 80 (42.33%) |
| *1*n (%) | | |

## 2. 6.0 Knowledge of cholera calendar year. By Sex, Level of Education, Religion

\*\*Knowledge of cholera calendar year by demographic variables\*\*

| **Characteristic** | \*\*knowledge*on*cholera*season*do*not*know\*\*  N = 201 | \*\*knowledge*on*cholera*season*in*rainy*season\*\*  N = 7571 | \*\*knowledge*on*cholera*season*in\_summer\*\*  N = 631 | \*\*knowledge*on*cholera*season*in\_winter\*\*  N = 291 |
| --- | --- | --- | --- | --- |
| sex |  |  |  |  |
| female | 16 (2.5%) | 580 (89.4%) | 38 (5.9%) | 15 (2.3%) |
| male | 4 (1.8%) | 177 (80.5%) | 25 (11.4%) | 14 (6.4%) |
| age\_group |  |  |  |  |
| >50 | 5 (2.5%) | 164 (82.4%) | 19 (9.5%) | 11 (5.5%) |
| 18-30 | 10 (3.3%) | 272 (88.9%) | 16 (5.2%) | 8 (2.6%) |
| 31-50 | 5 (1.4%) | 321 (88.2%) | 28 (7.7%) | 10 (2.7%) |
| level\_education |  |  |  |  |
| none | 2 (1.7%) | 105 (90.5%) | 7 (6.0%) | 2 (1.7%) |
| primary | 17 (3.2%) | 471 (87.7%) | 34 (6.3%) | 15 (2.8%) |
| secondary | 1 (0.5%) | 163 (83.6%) | 20 (10.3%) | 11 (5.6%) |
| tertiary | 0 (0.0%) | 18 (85.7%) | 2 (9.5%) | 1 (4.8%) |
| religion |  |  |  |  |
| Christianity | 17 (2.6%) | 559 (85.7%) | 53 (8.1%) | 23 (3.5%) |
| muslim | 3 (1.6%) | 174 (91.1%) | 9 (4.7%) | 5 (2.6%) |
| others\_regligion | 0 (0.0%) | 24 (92.3%) | 1 (3.8%) | 1 (3.8%) |
| 1n (%) | | | | |

## 2. 7. 0 Knowledge of the potential Cause of Cholera by demographi variables

| **Characteristic** | **affected by cholera germ** N = 20*1* | **affected by rota virus** N = 5*1* | **density population** N = 39*1* | **donot know 1** N = 25*1* | **eating rotten food lack food protection against contamination** N = 354*1* | **hot humid climate** N = 13*1* | **illiteracy ignorance on health education** N = 54*1* | **inadeguate safe water supply system** N = 156*1* | **lack of safe drinking water** N = 449*1* | **not taking vaccine** N = 16*1* | **not wash hands** N = 274*1* | **touching food without clean hands** N = 247*1* | **unhygiene disposal of excreta and refuse** N = 375*1* | **unhygiene living environment** N = 419*1* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sex |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| female | 16 (80.0%) | 4 (80.0%) | 23 (59.0%) | 22 (88.0%) | 271 (76.6%) | 9 (69.2%) | 31 (57.4%) | 112 (71.8%) | 329 (73.3%) | 8 (50.0%) | 214 (78.1%) | 191 (77.3%) | 275 (73.3%) | 327 (78.0%) |
| male | 4 (20.0%) | 1 (20.0%) | 16 (41.0%) | 3 (12.0%) | 83 (23.4%) | 4 (30.8%) | 23 (42.6%) | 44 (28.2%) | 120 (26.7%) | 8 (50.0%) | 60 (21.9%) | 56 (22.7%) | 100 (26.7%) | 92 (22.0%) |
| age\_group |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| >50 | 5 (25.0%) | 1 (20.0%) | 13 (33.3%) | 7 (28.0%) | 86 (24.3%) | 3 (23.1%) | 14 (25.9%) | 38 (24.4%) | 103 (22.9%) | 5 (31.3%) | 64 (23.4%) | 50 (20.2%) | 80 (21.3%) | 92 (22.0%) |
| 18-30 | 6 (30.0%) | 2 (40.0%) | 12 (30.8%) | 10 (40.0%) | 123 (34.7%) | 5 (38.5%) | 13 (24.1%) | 56 (35.9%) | 144 (32.1%) | 5 (31.3%) | 89 (32.5%) | 88 (35.6%) | 138 (36.8%) | 144 (34.4%) |
| 31-50 | 9 (45.0%) | 2 (40.0%) | 14 (35.9%) | 8 (32.0%) | 145 (41.0%) | 5 (38.5%) | 27 (50.0%) | 62 (39.7%) | 202 (45.0%) | 6 (37.5%) | 121 (44.2%) | 109 (44.1%) | 157 (41.9%) | 183 (43.7%) |
| level\_education |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| none | 1 (5.0%) | 0 (0.0%) | 7 (17.9%) | 7 (28.0%) | 45 (12.7%) | 1 (7.7%) | 11 (20.4%) | 18 (11.5%) | 56 (12.5%) | 2 (12.5%) | 30 (10.9%) | 23 (9.3%) | 38 (10.1%) | 53 (12.6%) |
| primary | 13 (65.0%) | 1 (20.0%) | 19 (48.7%) | 18 (72.0%) | 229 (64.7%) | 8 (61.5%) | 31 (57.4%) | 101 (64.7%) | 287 (63.9%) | 8 (50.0%) | 178 (65.0%) | 166 (67.2%) | 229 (61.1%) | 260 (62.1%) |
| secondary | 5 (25.0%) | 3 (60.0%) | 12 (30.8%) | 0 (0.0%) | 75 (21.2%) | 4 (30.8%) | 8 (14.8%) | 34 (21.8%) | 94 (20.9%) | 5 (31.3%) | 58 (21.2%) | 51 (20.6%) | 96 (25.6%) | 96 (22.9%) |
| tertiary | 1 (5.0%) | 1 (20.0%) | 1 (2.6%) | 0 (0.0%) | 5 (1.4%) | 0 (0.0%) | 4 (7.4%) | 3 (1.9%) | 12 (2.7%) | 1 (6.3%) | 8 (2.9%) | 7 (2.8%) | 12 (3.2%) | 10 (2.4%) |
| religion |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Christianity | 14 (70.0%) | 3 (60.0%) | 31 (79.5%) | 16 (64.0%) | 275 (77.7%) | 10 (76.9%) | 42 (77.8%) | 124 (79.5%) | 339 (75.5%) | 14 (87.5%) | 207 (75.5%) | 192 (77.7%) | 292 (77.9%) | 320 (76.4%) |
| muslim | 6 (30.0%) | 1 (20.0%) | 8 (20.5%) | 9 (36.0%) | 66 (18.6%) | 3 (23.1%) | 11 (20.4%) | 29 (18.6%) | 104 (23.2%) | 2 (12.5%) | 59 (21.5%) | 51 (20.6%) | 72 (19.2%) | 83 (19.8%) |
| others\_regligion | 0 (0.0%) | 1 (20.0%) | 0 (0.0%) | 0 (0.0%) | 13 (3.7%) | 0 (0.0%) | 1 (1.9%) | 3 (1.9%) | 6 (1.3%) | 0 (0.0%) | 8 (2.9%) | 4 (1.6%) | 11 (2.9%) | 16 (3.8%) |
| ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| chewa | 8 (40.0%) | 4 (80.0%) | 23 (59.0%) | 12 (48.0%) | 192 (54.2%) | 9 (69.2%) | 32 (59.3%) | 78 (50.0%) | 212 (47.2%) | 6 (37.5%) | 131 (47.8%) | 119 (48.2%) | 188 (50.1%) | 194 (46.3%) |
| lomwe | 0 (0.0%) | 0 (0.0%) | 2 (5.1%) | 2 (8.0%) | 23 (6.5%) | 1 (7.7%) | 3 (5.6%) | 14 (9.0%) | 29 (6.5%) | 2 (12.5%) | 19 (6.9%) | 17 (6.9%) | 32 (8.5%) | 38 (9.1%) |
| ngonde | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.3%) | 0 (0.0%) | 0 (0.0%) | 1 (0.6%) | 3 (0.7%) | 0 (0.0%) | 2 (0.7%) | 2 (0.8%) | 3 (0.8%) | 4 (1.0%) |
| ngoni | 4 (20.0%) | 0 (0.0%) | 4 (10.3%) | 2 (8.0%) | 53 (15.0%) | 0 (0.0%) | 5 (9.3%) | 27 (17.3%) | 60 (13.4%) | 1 (6.3%) | 42 (15.3%) | 38 (15.4%) | 58 (15.5%) | 68 (16.2%) |
| nyanja | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (0.8%) | 0 (0.0%) | 0 (0.0%) | 1 (0.6%) | 9 (2.0%) | 0 (0.0%) | 3 (1.1%) | 4 (1.6%) | 6 (1.6%) | 11 (2.6%) |
| other\_enthni | 2 (10.0%) | 0 (0.0%) | 0 (0.0%) | 1 (4.0%) | 2 (0.6%) | 0 (0.0%) | 1 (1.9%) | 1 (0.6%) | 3 (0.7%) | 0 (0.0%) | 1 (0.4%) | 1 (0.4%) | 1 (0.3%) | 6 (1.4%) |
| sena | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (0.7%) | 0 (0.0%) | 2 (0.7%) | 2 (0.8%) | 1 (0.3%) | 3 (0.7%) |
| tonga | 1 (5.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 14 (4.0%) | 0 (0.0%) | 2 (3.7%) | 7 (4.5%) | 22 (4.9%) | 4 (25.0%) | 9 (3.3%) | 11 (4.5%) | 12 (3.2%) | 14 (3.3%) |
| tumbuka | 1 (5.0%) | 0 (0.0%) | 3 (7.7%) | 0 (0.0%) | 6 (1.7%) | 0 (0.0%) | 2 (3.7%) | 2 (1.3%) | 7 (1.6%) | 1 (6.3%) | 4 (1.5%) | 6 (2.4%) | 6 (1.6%) | 8 (1.9%) |
| yao | 4 (20.0%) | 1 (20.0%) | 7 (17.9%) | 8 (32.0%) | 60 (16.9%) | 3 (23.1%) | 9 (16.7%) | 25 (16.0%) | 101 (22.5%) | 2 (12.5%) | 61 (22.3%) | 47 (19.0%) | 68 (18.1%) | 73 (17.4%) |
| *1*n (%) | | | | | | | | | | | | | | |

## 2. 8. 0 Knowledge of the potential Cause of Cholera by demographi variables

| **Characteristic** | **affected by cholera germ** N = 20*1* | **affected by rota virus** N = 5*1* | **density population** N = 39*1* | **donot know 1** N = 25*1* | **eating rotten food lack food protection against contamination** N = 354*1* | **hot humid climate** N = 13*1* | **illiteracy ignorance on health education** N = 54*1* | **inadeguate safe water supply system** N = 156*1* | **lack of safe drinking water** N = 449*1* | **not taking vaccine** N = 16*1* | **not wash hands** N = 274*1* | **touching food without clean hands** N = 247*1* | **unhygiene disposal of excreta and refuse** N = 375*1* | **unhygiene living environment** N = 419*1* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| district |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Balaka | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 13 (3.7%) | 0 (0.0%) | 0 (0.0%) | 4 (2.6%) | 19 (4.2%) | 0 (0.0%) | 10 (3.6%) | 5 (2.0%) | 15 (4.0%) | 19 (4.5%) |
| Blantyre | 6 (30.0%) | 0 (0.0%) | 2 (5.1%) | 2 (8.0%) | 39 (11.0%) | 0 (0.0%) | 1 (1.9%) | 17 (10.9%) | 54 (12.0%) | 1 (6.3%) | 41 (15.0%) | 40 (16.2%) | 51 (13.6%) | 79 (18.9%) |
| Dedza | 2 (10.0%) | 1 (20.0%) | 14 (35.9%) | 2 (8.0%) | 64 (18.1%) | 2 (15.4%) | 11 (20.4%) | 38 (24.4%) | 85 (18.9%) | 2 (12.5%) | 54 (19.7%) | 51 (20.6%) | 72 (19.2%) | 60 (14.3%) |
| Lilongwe | 4 (20.0%) | 3 (60.0%) | 12 (30.8%) | 13 (52.0%) | 141 (39.8%) | 6 (46.2%) | 25 (46.3%) | 59 (37.8%) | 140 (31.2%) | 4 (25.0%) | 87 (31.8%) | 76 (30.8%) | 136 (36.3%) | 140 (33.4%) |
| Mangochi | 2 (10.0%) | 1 (20.0%) | 5 (12.8%) | 8 (32.0%) | 37 (10.5%) | 1 (7.7%) | 6 (11.1%) | 14 (9.0%) | 76 (16.9%) | 0 (0.0%) | 38 (13.9%) | 33 (13.4%) | 40 (10.7%) | 60 (14.3%) |
| Nkhatabay | 3 (15.0%) | 0 (0.0%) | 3 (7.7%) | 0 (0.0%) | 19 (5.4%) | 0 (0.0%) | 4 (7.4%) | 9 (5.8%) | 31 (6.9%) | 5 (31.3%) | 13 (4.7%) | 16 (6.5%) | 21 (5.6%) | 24 (5.7%) |
| Salima | 3 (15.0%) | 0 (0.0%) | 3 (7.7%) | 0 (0.0%) | 41 (11.6%) | 4 (30.8%) | 7 (13.0%) | 15 (9.6%) | 44 (9.8%) | 4 (25.0%) | 31 (11.3%) | 26 (10.5%) | 40 (10.7%) | 37 (8.8%) |
| residence |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| In land | 12 (60.0%) | 4 (80.0%) | 28 (71.8%) | 17 (68.0%) | 244 (68.9%) | 8 (61.5%) | 37 (68.5%) | 114 (73.1%) | 279 (62.1%) | 7 (43.8%) | 182 (66.4%) | 167 (67.6%) | 259 (69.1%) | 279 (66.6%) |
| lake shore | 8 (40.0%) | 1 (20.0%) | 11 (28.2%) | 8 (32.0%) | 110 (31.1%) | 5 (38.5%) | 17 (31.5%) | 42 (26.9%) | 170 (37.9%) | 9 (56.3%) | 92 (33.6%) | 80 (32.4%) | 116 (30.9%) | 140 (33.4%) |
| *1*n (%) | | | | | | | | | | | | | | |

# Social and cultural behavior determinants of vaccine uptake

## 3.1. 0 Aware of Cholera Vaccine by Age Group, Sex Level of Education, and ethnnicty

| **Characteristic** | **no** N = 216*1* | **yes** N = 579*1* |
| --- | --- | --- |
| sex |  |  |
| female | 166 (27.3%) | 441 (72.7%) |
| male | 50 (26.6%) | 138 (73.4%) |
| age\_group |  |  |
| >50 | 48 (27.6%) | 126 (72.4%) |
| 18-30 | 75 (26.0%) | 214 (74.0%) |
| 31-50 | 93 (28.0%) | 239 (72.0%) |
| level\_education |  |  |
| none | 42 (38.9%) | 66 (61.1%) |
| primary | 144 (28.9%) | 355 (71.1%) |
| secondary | 27 (15.9%) | 143 (84.1%) |
| tertiary | 3 (16.7%) | 15 (83.3%) |
| religion |  |  |
| Christianity | 143 (24.2%) | 449 (75.8%) |
| muslim | 64 (35.8%) | 115 (64.2%) |
| others\_regligion | 9 (37.5%) | 15 (62.5%) |
| ethnicity |  |  |
| chewa | 93 (23.7%) | 299 (76.3%) |
| lomwe | 26 (40.0%) | 39 (60.0%) |
| ngonde | 0 (0.0%) | 4 (100.0%) |
| ngoni | 27 (26.7%) | 74 (73.3%) |
| nyanja | 3 (21.4%) | 11 (78.6%) |
| other\_enthni | 2 (22.2%) | 7 (77.8%) |
| sena | 0 (0.0%) | 3 (100.0%) |
| tonga | 2 (8.3%) | 22 (91.7%) |
| tumbuka | 2 (18.2%) | 9 (81.8%) |
| yao | 61 (35.5%) | 111 (64.5%) |
| *1*n (%) | | |

## 3.1. 1 Aware of Cholera Vaccine by District and Residence

| **Characteristic** | **no** N = 216*1* | **yes** N = 579*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 15 (44.1%) | 19 (55.9%) |
| Blantyre | 30 (23.1%) | 100 (76.9%) |
| Dedza | 24 (22.9%) | 81 (77.1%) |
| Lilongwe | 87 (29.0%) | 213 (71.0%) |
| Mangochi | 46 (35.7%) | 83 (64.3%) |
| Nkhatabay | 3 (8.3%) | 33 (91.7%) |
| Salima | 11 (18.0%) | 50 (82.0%) |
| residence |  |  |
| In land | 141 (26.4%) | 394 (73.6%) |
| lake shore | 75 (28.8%) | 185 (71.2%) |
| *1*n (%) | | |

## 3.2.0 Believe Cholera Vaccine Prevent Cholera by Sex, Level of Education, Enthnicity

| **Characteristic** | **no\_ocv** N = 66*1* | **not\_sure\_ocv** N = 91*1* | **yes\_ocv** N = 576*1* |
| --- | --- | --- | --- |
| sex |  |  |  |
| female | 49 (8.8%) | 76 (13.6%) | 433 (77.6%) |
| male | 17 (9.7%) | 15 (8.6%) | 143 (81.7%) |
| age\_group |  |  |  |
| >50 | 12 (7.3%) | 23 (14.0%) | 129 (78.7%) |
| 18-30 | 21 (7.9%) | 24 (9.0%) | 221 (83.1%) |
| 31-50 | 33 (10.9%) | 44 (14.5%) | 226 (74.6%) |
| level\_education |  |  |  |
| none | 12 (12.1%) | 13 (13.1%) | 74 (74.7%) |
| primary | 34 (7.5%) | 60 (13.2%) | 361 (79.3%) |
| secondary | 19 (11.8%) | 16 (9.9%) | 126 (78.3%) |
| tertiary | 1 (5.6%) | 2 (11.1%) | 15 (83.3%) |
| religion |  |  |  |
| Christianity | 41 (7.5%) | 71 (13.0%) | 436 (79.6%) |
| muslim | 21 (13.0%) | 19 (11.7%) | 122 (75.3%) |
| others\_regligion | 4 (17.4%) | 1 (4.3%) | 18 (78.3%) |
| ethnicity |  |  |  |
| chewa | 26 (7.2%) | 39 (10.8%) | 297 (82.0%) |
| lomwe | 10 (16.7%) | 5 (8.3%) | 45 (75.0%) |
| ngonde | 0 (0.0%) | 2 (50.0%) | 2 (50.0%) |
| ngoni | 7 (7.7%) | 15 (16.5%) | 69 (75.8%) |
| nyanja | 3 (21.4%) | 1 (7.1%) | 10 (71.4%) |
| other\_enthni | 0 (0.0%) | 1 (11.1%) | 8 (88.9%) |
| sena | 0 (0.0%) | 0 (0.0%) | 3 (100.0%) |
| tonga | 1 (4.3%) | 6 (26.1%) | 16 (69.6%) |
| tumbuka | 1 (10.0%) | 2 (20.0%) | 7 (70.0%) |
| yao | 18 (11.5%) | 20 (12.7%) | 119 (75.8%) |
| *1*n (%) | | | |

## 3.2.1 Believe Cholera Vaccine Prevent District and Residence

| **Characteristic** | **no\_ocv** N = 66*1* | **not\_sure\_ocv** N = 91*1* | **yes\_ocv** N = 576*1* |
| --- | --- | --- | --- |
| district |  |  |  |
| Balaka | 1 (3.3%) | 5 (16.7%) | 24 (80.0%) |
| Blantyre | 20 (16.1%) | 11 (8.9%) | 93 (75.0%) |
| Dedza | 4 (4.1%) | 20 (20.4%) | 74 (75.5%) |
| Lilongwe | 23 (8.4%) | 27 (9.9%) | 224 (81.8%) |
| Mangochi | 11 (9.5%) | 10 (8.6%) | 95 (81.9%) |
| Nkhatabay | 1 (2.9%) | 10 (28.6%) | 24 (68.6%) |
| Salima | 6 (10.7%) | 8 (14.3%) | 42 (75.0%) |
| residence |  |  |  |
| In land | 47 (9.5%) | 58 (11.7%) | 391 (78.8%) |
| lake shore | 19 (8.0%) | 33 (13.9%) | 185 (78.1%) |
| *1*n (%) | | | |

##3.3. 0 Information about Cholera Vaccine by Sex, Age Group, Education, Religion

\*\*Information about cholera vaccine by demographic variables\*\*

| **Characteristic** | **communication campaign**  N = 1661 | **community leaders**  N = 2571 | **friends family**  N = 561 | **government**  N = 371 | **healthcare providers**  N = 5101 | **internet**  N = 251 | **other information**  N = 431 | **print media**  N = 171 | **radio**  N = 2861 | **religious leaders**  N = 1481 | **social media**  N = 1301 | **tv**  N = 461 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sex |  |  |  |  |  |  |  |  |  |  |  |  |
| female | 117 (70.5%) | 188 (73.2%) | 33 (58.9%) | 20 (54.1%) | 395 (77.5%) | 14 (56.0%) | 35 (81.4%) | 11 (64.7%) | 210 (73.4%) | 106 (71.6%) | 91 (70.0%) | 32 (69.6%) |
| male | 49 (29.5%) | 69 (26.8%) | 23 (41.1%) | 17 (45.9%) | 115 (22.5%) | 11 (44.0%) | 8 (18.6%) | 6 (35.3%) | 76 (26.6%) | 42 (28.4%) | 39 (30.0%) | 14 (30.4%) |
| age\_group |  |  |  |  |  |  |  |  |  |  |  |  |
| >50 | 37 (22.3%) | 63 (24.5%) | 15 (26.8%) | 8 (21.6%) | 127 (24.9%) | 4 (16.0%) | 3 (7.0%) | 5 (29.4%) | 51 (17.8%) | 38 (25.7%) | 18 (13.8%) | 9 (19.6%) |
| 18-30 | 54 (32.5%) | 85 (33.1%) | 17 (30.4%) | 15 (40.5%) | 168 (32.9%) | 7 (28.0%) | 23 (53.5%) | 6 (35.3%) | 109 (38.1%) | 41 (27.7%) | 48 (36.9%) | 15 (32.6%) |
| 31-50 | 75 (45.2%) | 109 (42.4%) | 24 (42.9%) | 14 (37.8%) | 215 (42.2%) | 14 (56.0%) | 17 (39.5%) | 6 (35.3%) | 126 (44.1%) | 69 (46.6%) | 64 (49.2%) | 22 (47.8%) |
| level\_education |  |  |  |  |  |  |  |  |  |  |  |  |
| none | 17 (10.2%) | 47 (18.3%) | 6 (10.7%) | 5 (13.5%) | 76 (14.9%) | 2 (8.0%) | 2 (4.7%) | 1 (5.9%) | 25 (8.7%) | 25 (16.9%) | 11 (8.5%) | 1 (2.2%) |
| primary | 111 (66.9%) | 157 (61.1%) | 35 (62.5%) | 21 (56.8%) | 323 (63.3%) | 8 (32.0%) | 25 (58.1%) | 9 (52.9%) | 189 (66.1%) | 85 (57.4%) | 70 (53.8%) | 24 (52.2%) |
| secondary | 34 (20.5%) | 50 (19.5%) | 14 (25.0%) | 7 (18.9%) | 104 (20.4%) | 13 (52.0%) | 14 (32.6%) | 6 (35.3%) | 66 (23.1%) | 35 (23.6%) | 40 (30.8%) | 17 (37.0%) |
| tertiary | 4 (2.4%) | 3 (1.2%) | 1 (1.8%) | 4 (10.8%) | 7 (1.4%) | 2 (8.0%) | 2 (4.7%) | 1 (5.9%) | 6 (2.1%) | 3 (2.0%) | 9 (6.9%) | 4 (8.7%) |
| religion |  |  |  |  |  |  |  |  |  |  |  |  |
| Christianity | 135 (81.3%) | 187 (72.8%) | 42 (75.0%) | 27 (73.0%) | 375 (73.5%) | 19 (76.0%) | 32 (74.4%) | 15 (88.2%) | 216 (75.5%) | 114 (77.0%) | 93 (71.5%) | 33 (71.7%) |
| muslim | 25 (15.1%) | 60 (23.3%) | 14 (25.0%) | 10 (27.0%) | 122 (23.9%) | 6 (24.0%) | 9 (20.9%) | 0 (0.0%) | 62 (21.7%) | 30 (20.3%) | 34 (26.2%) | 13 (28.3%) |
| others\_regligion | 6 (3.6%) | 10 (3.9%) | 0 (0.0%) | 0 (0.0%) | 13 (2.5%) | 0 (0.0%) | 2 (4.7%) | 2 (11.8%) | 8 (2.8%) | 4 (2.7%) | 3 (2.3%) | 0 (0.0%) |
| ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |
| chewa | 87 (52.4%) | 118 (45.9%) | 27 (48.2%) | 14 (37.8%) | 251 (49.2%) | 11 (44.0%) | 24 (55.8%) | 11 (64.7%) | 139 (48.6%) | 67 (45.3%) | 40 (30.8%) | 18 (39.1%) |
| lomwe | 16 (9.6%) | 15 (5.8%) | 5 (8.9%) | 2 (5.4%) | 37 (7.3%) | 3 (12.0%) | 4 (9.3%) | 1 (5.9%) | 25 (8.7%) | 12 (8.1%) | 24 (18.5%) | 8 (17.4%) |
| ngonde | 1 (0.6%) | 2 (0.8%) | 0 (0.0%) | 0 (0.0%) | 3 (0.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (0.7%) | 1 (0.7%) | 1 (0.8%) | 0 (0.0%) |
| ngoni | 22 (13.3%) | 39 (15.2%) | 7 (12.5%) | 2 (5.4%) | 63 (12.4%) | 2 (8.0%) | 5 (11.6%) | 3 (17.6%) | 36 (12.6%) | 18 (12.2%) | 17 (13.1%) | 4 (8.7%) |
| nyanja | 4 (2.4%) | 7 (2.7%) | 1 (1.8%) | 2 (5.4%) | 9 (1.8%) | 0 (0.0%) | 1 (2.3%) | 0 (0.0%) | 3 (1.0%) | 6 (4.1%) | 1 (0.8%) | 0 (0.0%) |
| other\_enthni | 4 (2.4%) | 3 (1.2%) | 1 (1.8%) | 0 (0.0%) | 6 (1.2%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (0.7%) | 1 (0.7%) | 2 (1.5%) | 0 (0.0%) |
| sena | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (0.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.3%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| tonga | 8 (4.8%) | 12 (4.7%) | 1 (1.8%) | 4 (10.8%) | 18 (3.5%) | 2 (8.0%) | 0 (0.0%) | 2 (11.8%) | 12 (4.2%) | 10 (6.8%) | 8 (6.2%) | 3 (6.5%) |
| tumbuka | 2 (1.2%) | 4 (1.6%) | 2 (3.6%) | 3 (8.1%) | 7 (1.4%) | 1 (4.0%) | 0 (0.0%) | 0 (0.0%) | 5 (1.7%) | 3 (2.0%) | 4 (3.1%) | 2 (4.3%) |
| yao | 22 (13.3%) | 57 (22.2%) | 12 (21.4%) | 10 (27.0%) | 113 (22.2%) | 6 (24.0%) | 9 (20.9%) | 0 (0.0%) | 61 (21.3%) | 30 (20.3%) | 33 (25.4%) | 11 (23.9%) |
| 1n (%) | | | | | | | | | | | | |

## 3.3. 1 Information about Cholera Vaccine by District and Residence

\*\*Information about cholera vaccine by District and Residence\*\*

| **Characteristic** | **ocv information communication campaign**  N = 1661 | **ocv information community leaders**  N = 2571 | **ocv information friends family**  N = 561 | **ocv information government**  N = 371 | **ocv information healthcare providers**  N = 5101 | **ocv information internet**  N = 251 | **ocv information other information**  N = 431 | **ocv information print media**  N = 171 | **ocv information radio**  N = 2861 | **ocv information religious leaders**  N = 1481 | **ocv information social media**  N = 1301 | **ocv information tv**  N = 461 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| district |  |  |  |  |  |  |  |  |  |  |  |  |
| Balaka | 5 (3.0%) | 15 (5.8%) | 0 (0.0%) | 0 (0.0%) | 24 (4.7%) | 2 (8.0%) | 2 (4.7%) | 1 (5.9%) | 14 (4.9%) | 6 (4.1%) | 11 (8.5%) | 1 (2.2%) |
| Blantyre | 27 (16.3%) | 32 (12.5%) | 6 (10.7%) | 2 (5.4%) | 73 (14.3%) | 5 (20.0%) | 8 (18.6%) | 4 (23.5%) | 43 (15.0%) | 18 (12.2%) | 41 (31.5%) | 10 (21.7%) |
| Dedza | 35 (21.1%) | 52 (20.2%) | 15 (26.8%) | 6 (16.2%) | 79 (15.5%) | 3 (12.0%) | 6 (14.0%) | 4 (23.5%) | 48 (16.8%) | 35 (23.6%) | 8 (6.2%) | 9 (19.6%) |
| Lilongwe | 57 (34.3%) | 74 (28.8%) | 19 (33.9%) | 7 (18.9%) | 168 (32.9%) | 8 (32.0%) | 20 (46.5%) | 5 (29.4%) | 87 (30.4%) | 37 (25.0%) | 25 (19.2%) | 8 (17.4%) |
| Mangochi | 13 (7.8%) | 37 (14.4%) | 6 (10.7%) | 6 (16.2%) | 86 (16.9%) | 2 (8.0%) | 5 (11.6%) | 0 (0.0%) | 43 (15.0%) | 22 (14.9%) | 23 (17.7%) | 6 (13.0%) |
| Nkhatabay | 12 (7.2%) | 19 (7.4%) | 3 (5.4%) | 7 (18.9%) | 29 (5.7%) | 3 (12.0%) | 0 (0.0%) | 2 (11.8%) | 16 (5.6%) | 15 (10.1%) | 12 (9.2%) | 6 (13.0%) |
| Salima | 17 (10.2%) | 28 (10.9%) | 7 (12.5%) | 9 (24.3%) | 51 (10.0%) | 2 (8.0%) | 2 (4.7%) | 1 (5.9%) | 35 (12.2%) | 15 (10.1%) | 10 (7.7%) | 6 (13.0%) |
| residence |  |  |  |  |  |  |  |  |  |  |  |  |
| In land | 119 (71.7%) | 158 (61.5%) | 40 (71.4%) | 15 (40.5%) | 320 (62.7%) | 16 (64.0%) | 34 (79.1%) | 13 (76.5%) | 178 (62.2%) | 90 (60.8%) | 74 (56.9%) | 27 (58.7%) |
| lake shore | 47 (28.3%) | 99 (38.5%) | 16 (28.6%) | 22 (59.5%) | 190 (37.3%) | 9 (36.0%) | 9 (20.9%) | 4 (23.5%) | 108 (37.8%) | 58 (39.2%) | 56 (43.1%) | 19 (41.3%) |
| 1n (%) | | | | | | | | | | | | |

## 3. 4. 0 Safe of Cholera Vaccine by Sex Age Group Education, Religion, ethinicity

| **Characteristic** | **a\_little\_safe** N = 28*1* | **I\_dont\_know** N = 116*1* | **moderate\_safe** N = 22*1* | **not\_safe\_at\_all** N = 26*1* | **very\_safe** N = 603*1* |
| --- | --- | --- | --- | --- | --- |
| sex |  |  |  |  |  |
| female | 22 (3.6%) | 94 (15.5%) | 17 (2.8%) | 18 (3.0%) | 456 (75.1%) |
| male | 6 (3.2%) | 22 (11.7%) | 5 (2.7%) | 8 (4.3%) | 147 (78.2%) |
| age\_group |  |  |  |  |  |
| >50 | 8 (4.6%) | 32 (18.4%) | 7 (4.0%) | 3 (1.7%) | 124 (71.3%) |
| 18-30 | 9 (3.1%) | 35 (12.1%) | 7 (2.4%) | 8 (2.8%) | 230 (79.6%) |
| 31-50 | 11 (3.3%) | 49 (14.8%) | 8 (2.4%) | 15 (4.5%) | 249 (75.0%) |
| level\_education |  |  |  |  |  |
| none | 6 (5.6%) | 18 (16.7%) | 2 (1.9%) | 7 (6.5%) | 75 (69.4%) |
| primary | 16 (3.2%) | 76 (15.2%) | 14 (2.8%) | 13 (2.6%) | 380 (76.2%) |
| secondary | 6 (3.5%) | 19 (11.2%) | 5 (2.9%) | 5 (2.9%) | 135 (79.4%) |
| tertiary | 0 (0.0%) | 3 (16.7%) | 1 (5.6%) | 1 (5.6%) | 13 (72.2%) |
| religion |  |  |  |  |  |
| Christianity | 15 (2.5%) | 79 (13.3%) | 20 (3.4%) | 19 (3.2%) | 459 (77.5%) |
| muslim | 11 (6.1%) | 32 (17.9%) | 2 (1.1%) | 6 (3.4%) | 128 (71.5%) |
| others\_regligion | 2 (8.3%) | 5 (20.8%) | 0 (0.0%) | 1 (4.2%) | 16 (66.7%) |
| ethnicity |  |  |  |  |  |
| chewa | 11 (2.8%) | 50 (12.8%) | 15 (3.8%) | 10 (2.6%) | 306 (78.1%) |
| lomwe | 2 (3.1%) | 9 (13.8%) | 3 (4.6%) | 3 (4.6%) | 48 (73.8%) |
| ngonde | 0 (0.0%) | 2 (50.0%) | 0 (0.0%) | 0 (0.0%) | 2 (50.0%) |
| ngoni | 3 (3.0%) | 16 (15.8%) | 2 (2.0%) | 2 (2.0%) | 78 (77.2%) |
| nyanja | 1 (7.1%) | 3 (21.4%) | 1 (7.1%) | 3 (21.4%) | 6 (42.9%) |
| other\_enthni | 0 (0.0%) | 1 (11.1%) | 0 (0.0%) | 0 (0.0%) | 8 (88.9%) |
| sena | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (33.3%) | 2 (66.7%) |
| tonga | 1 (4.2%) | 5 (20.8%) | 0 (0.0%) | 1 (4.2%) | 17 (70.8%) |
| tumbuka | 0 (0.0%) | 2 (18.2%) | 1 (9.1%) | 0 (0.0%) | 8 (72.7%) |
| yao | 10 (5.8%) | 28 (16.3%) | 0 (0.0%) | 6 (3.5%) | 128 (74.4%) |
| *1*n (%) | | | | | |

##3. 4. 1 Safe of Cholera Vaccine by District and Residence

| **Characteristic** | **a\_little\_safe** N = 28*1* | **I\_dont\_know** N = 116*1* | **moderate\_safe** N = 22*1* | **not\_safe\_at\_all** N = 26*1* | **very\_safe** N = 603*1* |
| --- | --- | --- | --- | --- | --- |
| district |  |  |  |  |  |
| Balaka | 2 (5.9%) | 6 (17.6%) | 1 (2.9%) | 1 (2.9%) | 24 (70.6%) |
| Blantyre | 4 (3.1%) | 14 (10.8%) | 2 (1.5%) | 8 (6.2%) | 102 (78.5%) |
| Dedza | 1 (1.0%) | 18 (17.1%) | 6 (5.7%) | 0 (0.0%) | 80 (76.2%) |
| Lilongwe | 8 (2.7%) | 40 (13.3%) | 7 (2.3%) | 9 (3.0%) | 236 (78.7%) |
| Mangochi | 9 (7.0%) | 16 (12.4%) | 3 (2.3%) | 7 (5.4%) | 94 (72.9%) |
| Nkhatabay | 1 (2.8%) | 8 (22.2%) | 1 (2.8%) | 1 (2.8%) | 25 (69.4%) |
| Salima | 3 (4.9%) | 14 (23.0%) | 2 (3.3%) | 0 (0.0%) | 42 (68.9%) |
| residence |  |  |  |  |  |
| In land | 13 (2.4%) | 72 (13.5%) | 15 (2.8%) | 17 (3.2%) | 418 (78.1%) |
| lake shore | 15 (5.8%) | 44 (16.9%) | 7 (2.7%) | 9 (3.5%) | 185 (71.2%) |
| *1*n (%) | | | | | |

## 3. 5. 0 Community Influence decision about vaccination by demographic variables

\*\*Community influence decision about vaccination by Demographics\*\*

| **Characteristic** | **cultural traditional**  N = 1061 | **family pressure**  N = 141 | **none 2**  N = 111 | **other decision**  N = 341 | **religious**  N = 1071 |
| --- | --- | --- | --- | --- | --- |
| sex |  |  |  |  |  |
| female | 85 (80.2%) | 12 (85.7%) | 10 (90.9%) | 27 (79.4%) | 81 (75.7%) |
| male | 21 (19.8%) | 2 (14.3%) | 1 (9.1%) | 7 (20.6%) | 26 (24.3%) |
| age\_group |  |  |  |  |  |
| >50 | 18 (17.0%) | 3 (21.4%) | 1 (9.1%) | 5 (14.7%) | 21 (19.6%) |
| 18-30 | 40 (37.7%) | 4 (28.6%) | 2 (18.2%) | 13 (38.2%) | 45 (42.1%) |
| 31-50 | 48 (45.3%) | 7 (50.0%) | 8 (72.7%) | 16 (47.1%) | 41 (38.3%) |
| level\_education |  |  |  |  |  |
| none | 9 (8.5%) | 0 (0.0%) | 3 (27.3%) | 2 (5.9%) | 7 (6.5%) |
| primary | 64 (60.4%) | 10 (71.4%) | 5 (45.5%) | 20 (58.8%) | 65 (60.7%) |
| secondary | 30 (28.3%) | 2 (14.3%) | 2 (18.2%) | 11 (32.4%) | 30 (28.0%) |
| tertiary | 3 (2.8%) | 2 (14.3%) | 1 (9.1%) | 1 (2.9%) | 5 (4.7%) |
| religion |  |  |  |  |  |
| Christianity | 68 (64.2%) | 10 (71.4%) | 8 (72.7%) | 27 (79.4%) | 90 (84.1%) |
| muslim | 37 (34.9%) | 4 (28.6%) | 2 (18.2%) | 6 (17.6%) | 11 (10.3%) |
| others\_regligion | 1 (0.9%) | 0 (0.0%) | 1 (9.1%) | 1 (2.9%) | 6 (5.6%) |
| ethnicity |  |  |  |  |  |
| chewa | 37 (34.9%) | 4 (28.6%) | 7 (63.6%) | 18 (52.9%) | 50 (46.7%) |
| lomwe | 7 (6.6%) | 1 (7.1%) | 1 (9.1%) | 0 (0.0%) | 15 (14.0%) |
| ngonde | 1 (0.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.9%) |
| ngoni | 13 (12.3%) | 5 (35.7%) | 0 (0.0%) | 8 (23.5%) | 20 (18.7%) |
| nyanja | 1 (0.9%) | 0 (0.0%) | 0 (0.0%) | 2 (5.9%) | 0 (0.0%) |
| other\_enthni | 1 (0.9%) | 0 (0.0%) | 1 (9.1%) | 0 (0.0%) | 2 (1.9%) |
| sena | 1 (0.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.9%) |
| tonga | 2 (1.9%) | 1 (7.1%) | 0 (0.0%) | 1 (2.9%) | 3 (2.8%) |
| tumbuka | 3 (2.8%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.9%) |
| yao | 40 (37.7%) | 3 (21.4%) | 2 (18.2%) | 5 (14.7%) | 14 (13.1%) |
| 1n (%) | | | | | |

## 3. 5. 0 Community Influence decision about vaccination by District and residence

\*\*Community influence decision about vaccination by District and Residence\*\*

| **Characteristic** | **cultural traditional**  N = 1061 | **family pressure**  N = 141 | **none 2**  N = 111 | **other decision**  N = 341 | **religious**  N = 1071 |
| --- | --- | --- | --- | --- | --- |
| district |  |  |  |  |  |
| Balaka | 12 (11.3%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 7 (6.5%) |
| Blantyre | 26 (24.5%) | 3 (21.4%) | 1 (9.1%) | 10 (29.4%) | 28 (26.2%) |
| Dedza | 6 (5.7%) | 2 (14.3%) | 1 (9.1%) | 3 (8.8%) | 15 (14.0%) |
| Lilongwe | 21 (19.8%) | 3 (21.4%) | 7 (63.6%) | 13 (38.2%) | 36 (33.6%) |
| Mangochi | 34 (32.1%) | 3 (21.4%) | 2 (18.2%) | 6 (17.6%) | 11 (10.3%) |
| Nkhatabay | 4 (3.8%) | 1 (7.1%) | 0 (0.0%) | 1 (2.9%) | 4 (3.7%) |
| Salima | 3 (2.8%) | 2 (14.3%) | 0 (0.0%) | 1 (2.9%) | 6 (5.6%) |
| residence |  |  |  |  |  |
| In land | 53 (50.0%) | 8 (57.1%) | 9 (81.8%) | 26 (76.5%) | 79 (73.8%) |
| lake shore | 53 (50.0%) | 6 (42.9%) | 2 (18.2%) | 8 (23.5%) | 28 (26.2%) |
| 1n (%) | | | | | |

## 3. 6. 0 Difficult in access cholera vaccination by Sex, Education, Religion and ethnicity

| **Characteristic** | **easily\_accessible** N = 513*1* | **not\_accessible** N = 45*1* | **not\_easily\_accessible** N = 159*1* |
| --- | --- | --- | --- |
| **sex** |  |  |  |
| female | 399 (73.5%) | 33 (6.1%) | 111 (20.4%) |
| male | 114 (65.5%) | 12 (6.9%) | 48 (27.6%) |
| **age\_group** |  |  |  |
| >50 | 112 (70.9%) | 13 (8.2%) | 33 (20.9%) |
| 18-30 | 187 (72.8%) | 13 (5.1%) | 57 (22.2%) |
| 31-50 | 214 (70.9%) | 19 (6.3%) | 69 (22.8%) |
| **level\_education** |  |  |  |
| none | 61 (65.6%) | 7 (7.5%) | 25 (26.9%) |
| primary | 325 (72.4%) | 27 (6.0%) | 97 (21.6%) |
| secondary | 116 (73.0%) | 10 (6.3%) | 33 (20.8%) |
| tertiary | 11 (68.8%) | 1 (6.3%) | 4 (25.0%) |
| **religion** |  |  |  |
| Christianity | 399 (72.8%) | 31 (5.7%) | 118 (21.5%) |
| muslim | 102 (68.9%) | 12 (8.1%) | 34 (23.0%) |
| others\_regligion | 12 (57.1%) | 2 (9.5%) | 7 (33.3%) |
| *1*n (%) | | | |

## 3. 6. 1 Access cholera vaccination by District and residence

| **Characteristic** | **easily\_accessible** N = 513*1* | **not\_accessible** N = 45*1* | **not\_easily\_accessible** N = 159*1* |
| --- | --- | --- | --- |
| **district** |  |  |  |
| Balaka | 18 (60.0%) | 4 (13.3%) | 8 (26.7%) |
| Blantyre | 83 (67.5%) | 7 (5.7%) | 33 (26.8%) |
| Dedza | 78 (82.1%) | 5 (5.3%) | 12 (12.6%) |
| Lilongwe | 199 (72.6%) | 12 (4.4%) | 63 (23.0%) |
| Mangochi | 74 (66.7%) | 6 (5.4%) | 31 (27.9%) |
| Nkhatabay | 29 (85.3%) | 1 (2.9%) | 4 (11.8%) |
| Salima | 32 (64.0%) | 10 (20.0%) | 8 (16.0%) |
| **residence** |  |  |  |
| In land | 360 (73.2%) | 24 (4.9%) | 108 (22.0%) |
| lake shore | 153 (68.0%) | 21 (9.3%) | 51 (22.7%) |
| *1*n (%) | | | |

##3. 7. 0 OCV status by Sex, Age Group, Education Religious and ethnicity

| **Characteristic** | **no** N = 466*1* | **yes** N = 329*1* |
| --- | --- | --- |
| sex |  |  |
| female | 344 (56.7%) | 263 (43.3%) |
| male | 122 (64.9%) | 66 (35.1%) |
| age\_group |  |  |
| >50 | 107 (61.5%) | 67 (38.5%) |
| 18-30 | 167 (57.8%) | 122 (42.2%) |
| 31-50 | 192 (57.8%) | 140 (42.2%) |
| level\_education |  |  |
| none | 66 (61.1%) | 42 (38.9%) |
| primary | 295 (59.1%) | 204 (40.9%) |
| secondary | 91 (53.5%) | 79 (46.5%) |
| tertiary | 14 (77.8%) | 4 (22.2%) |
| religion |  |  |
| Christianity | 340 (57.4%) | 252 (42.6%) |
| muslim | 111 (62.0%) | 68 (38.0%) |
| others\_regligion | 15 (62.5%) | 9 (37.5%) |
| ethnicity |  |  |
| chewa | 207 (52.8%) | 185 (47.2%) |
| lomwe | 51 (78.5%) | 14 (21.5%) |
| ngonde | 4 (100.0%) | 0 (0.0%) |
| ngoni | 64 (63.4%) | 37 (36.6%) |
| nyanja | 9 (64.3%) | 5 (35.7%) |
| other\_enthni | 5 (55.6%) | 4 (44.4%) |
| sena | 1 (33.3%) | 2 (66.7%) |
| tonga | 13 (54.2%) | 11 (45.8%) |
| tumbuka | 5 (45.5%) | 6 (54.5%) |
| yao | 107 (62.2%) | 65 (37.8%) |
| *1*n (%) | | |

## 3. 7. 0 OCV status by District and Residence

| **Characteristic** | **no** N = 466*1* | **yes** N = 329*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 29 (85.3%) | 5 (14.7%) |
| Blantyre | 80 (61.5%) | 50 (38.5%) |
| Dedza | 64 (61.0%) | 41 (39.0%) |
| Lilongwe | 161 (53.7%) | 139 (46.3%) |
| Mangochi | 84 (65.1%) | 45 (34.9%) |
| Nkhatabay | 18 (50.0%) | 18 (50.0%) |
| Salima | 30 (49.2%) | 31 (50.8%) |
| residence |  |  |
| In land | 305 (57.0%) | 230 (43.0%) |
| lake shore | 161 (61.9%) | 99 (38.1%) |
| *1*n (%) | | |

## 3. 8. 0 Family Members vaccinated by demographi variables

| **Characteristic** | **no** N = 473*1* | **yes** N = 322*1* |
| --- | --- | --- |
| sex |  |  |
| female | 357 (58.8%) | 250 (41.2%) |
| male | 116 (61.7%) | 72 (38.3%) |
| age\_group |  |  |
| >50 | 102 (58.6%) | 72 (41.4%) |
| 18-30 | 174 (60.2%) | 115 (39.8%) |
| 31-50 | 197 (59.3%) | 135 (40.7%) |
| level\_education |  |  |
| none | 66 (61.1%) | 42 (38.9%) |
| primary | 300 (60.1%) | 199 (39.9%) |
| secondary | 92 (54.1%) | 78 (45.9%) |
| tertiary | 15 (83.3%) | 3 (16.7%) |
| religion |  |  |
| Christianity | 345 (58.3%) | 247 (41.7%) |
| muslim | 113 (63.1%) | 66 (36.9%) |
| others\_regligion | 15 (62.5%) | 9 (37.5%) |
| ethnicity |  |  |
| chewa | 209 (53.3%) | 183 (46.7%) |
| lomwe | 53 (81.5%) | 12 (18.5%) |
| ngonde | 3 (75.0%) | 1 (25.0%) |
| ngoni | 65 (64.4%) | 36 (35.6%) |
| nyanja | 7 (50.0%) | 7 (50.0%) |
| other\_enthni | 6 (66.7%) | 3 (33.3%) |
| sena | 2 (66.7%) | 1 (33.3%) |
| tonga | 14 (58.3%) | 10 (41.7%) |
| tumbuka | 7 (63.6%) | 4 (36.4%) |
| yao | 107 (62.2%) | 65 (37.8%) |
| *1*n (%) | | |

## 3. 8. 0 Family Members vaccinated by District and Residence

| **Characteristic** | **no** N = 473*1* | **yes** N = 322*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 30 (88.2%) | 4 (11.8%) |
| Blantyre | 84 (64.6%) | 46 (35.4%) |
| Dedza | 62 (59.0%) | 43 (41.0%) |
| Lilongwe | 161 (53.7%) | 139 (46.3%) |
| Mangochi | 80 (62.0%) | 49 (38.0%) |
| Nkhatabay | 20 (55.6%) | 16 (44.4%) |
| Salima | 36 (59.0%) | 25 (41.0%) |
| residence |  |  |
| In land | 307 (57.4%) | 228 (42.6%) |
| lake shore | 166 (63.8%) | 94 (36.2%) |
| *1*n (%) | | |

## 3. 9. 0 Willingness to get vaccinated in the Future OCV by Sex, Age Group, Education and ethnicity

| **Characteristic** | **no\_will** N = 34*1* | **not\_sure\_to\_get** N = 31*1* | **yes\_but\_wait\_later** N = 30*1* | **yes\_would\_get\_it** N = 700*1* |
| --- | --- | --- | --- | --- |
| sex |  |  |  |  |
| female | 24 (4.0%) | 22 (3.6%) | 24 (4.0%) | 537 (88.5%) |
| male | 10 (5.3%) | 9 (4.8%) | 6 (3.2%) | 163 (86.7%) |
| age\_group |  |  |  |  |
| >50 | 11 (6.3%) | 10 (5.7%) | 9 (5.2%) | 144 (82.8%) |
| 18-30 | 7 (2.4%) | 7 (2.4%) | 13 (4.5%) | 262 (90.7%) |
| 31-50 | 16 (4.8%) | 14 (4.2%) | 8 (2.4%) | 294 (88.6%) |
| level\_education |  |  |  |  |
| none | 8 (7.4%) | 8 (7.4%) | 7 (6.5%) | 85 (78.7%) |
| primary | 17 (3.4%) | 19 (3.8%) | 16 (3.2%) | 447 (89.6%) |
| secondary | 8 (4.7%) | 4 (2.4%) | 5 (2.9%) | 153 (90.0%) |
| tertiary | 1 (5.6%) | 0 (0.0%) | 2 (11.1%) | 15 (83.3%) |
| religion |  |  |  |  |
| Christianity | 23 (3.9%) | 20 (3.4%) | 22 (3.7%) | 527 (89.0%) |
| muslim | 8 (4.5%) | 10 (5.6%) | 8 (4.5%) | 153 (85.5%) |
| others\_regligion | 3 (12.5%) | 1 (4.2%) | 0 (0.0%) | 20 (83.3%) |
| ethnicity |  |  |  |  |
| chewa | 9 (2.3%) | 14 (3.6%) | 10 (2.6%) | 359 (91.6%) |
| lomwe | 5 (7.7%) | 1 (1.5%) | 5 (7.7%) | 54 (83.1%) |
| ngonde | 0 (0.0%) | 1 (25.0%) | 0 (0.0%) | 3 (75.0%) |
| ngoni | 6 (5.9%) | 3 (3.0%) | 4 (4.0%) | 88 (87.1%) |
| nyanja | 3 (21.4%) | 2 (14.3%) | 3 (21.4%) | 6 (42.9%) |
| other\_enthni | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 9 (100.0%) |
| sena | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (100.0%) |
| tonga | 4 (16.7%) | 1 (4.2%) | 0 (0.0%) | 19 (79.2%) |
| tumbuka | 0 (0.0%) | 1 (9.1%) | 1 (9.1%) | 9 (81.8%) |
| yao | 7 (4.1%) | 8 (4.7%) | 7 (4.1%) | 150 (87.2%) |
| *1*n (%) | | | | |

## 3. 9. 1 Willingness to get vaccinated in the Future OCV by District and Residence

| **Characteristic** | **no\_will** N = 34*1* | **not\_sure\_to\_get** N = 31*1* | **yes\_but\_wait\_later** N = 30*1* | **yes\_would\_get\_it** N = 700*1* |
| --- | --- | --- | --- | --- |
| district |  |  |  |  |
| Balaka | 0 (0.0%) | 1 (2.9%) | 2 (5.9%) | 31 (91.2%) |
| Blantyre | 9 (6.9%) | 4 (3.1%) | 12 (9.2%) | 105 (80.8%) |
| Dedza | 4 (3.8%) | 4 (3.8%) | 1 (1.0%) | 96 (91.4%) |
| Lilongwe | 10 (3.3%) | 12 (4.0%) | 8 (2.7%) | 270 (90.0%) |
| Mangochi | 4 (3.1%) | 5 (3.9%) | 6 (4.7%) | 114 (88.4%) |
| Nkhatabay | 4 (11.1%) | 3 (8.3%) | 0 (0.0%) | 29 (80.6%) |
| Salima | 3 (4.9%) | 2 (3.3%) | 1 (1.6%) | 55 (90.2%) |
| residence |  |  |  |  |
| In land | 23 (4.3%) | 20 (3.7%) | 21 (3.9%) | 471 (88.0%) |
| lake shore | 11 (4.2%) | 11 (4.2%) | 9 (3.5%) | 229 (88.1%) |
| *1*n (%) | | | | |

## 3. 10. 0 Recommend a Family member to get vaccinated by demographic variables

| **Characteristic** | **no\_ocv** N = 27*1* | **not\_sure\_ocv** N = 25*1* | **yes\_ocv** N = 734*1* |
| --- | --- | --- | --- |
| sex |  |  |  |
| female | 19 (3.16%) | 20 (3.33%) | 562 (93.51%) |
| male | 8 (4.32%) | 5 (2.70%) | 172 (92.97%) |
| age\_group |  |  |  |
| >50 | 10 (5.78%) | 8 (4.62%) | 155 (89.60%) |
| 18-30 | 4 (1.40%) | 8 (2.81%) | 273 (95.79%) |
| 31-50 | 13 (3.96%) | 9 (2.74%) | 306 (93.29%) |
| level\_education |  |  |  |
| none | 5 (4.76%) | 6 (5.71%) | 94 (89.52%) |
| primary | 18 (3.64%) | 14 (2.83%) | 463 (93.54%) |
| secondary | 3 (1.79%) | 4 (2.38%) | 161 (95.83%) |
| tertiary | 1 (5.56%) | 1 (5.56%) | 16 (88.89%) |
| religion |  |  |  |
| Christianity | 17 (2.90%) | 16 (2.73%) | 553 (94.37%) |
| muslim | 8 (4.55%) | 7 (3.98%) | 161 (91.48%) |
| others\_regligion | 2 (8.33%) | 2 (8.33%) | 20 (83.33%) |
| ethnicity |  |  |  |
| chewa | 8 (2.1%) | 12 (3.1%) | 368 (95%) |
| lomwe | 6 (9.2%) | 0 (0%) | 59 (91%) |
| ngonde | 0 (0%) | 0 (0%) | 4 (100%) |
| ngoni | 4 (4.0%) | 4 (4.0%) | 93 (92%) |
| nyanja | 2 (17%) | 2 (17%) | 8 (67%) |
| other\_enthni | 0 (0%) | 0 (0%) | 9 (100%) |
| sena | 0 (0%) | 0 (0%) | 3 (100%) |
| tonga | 3 (13%) | 0 (0%) | 21 (88%) |
| tumbuka | 0 (0%) | 0 (0%) | 11 (100%) |
| yao | 4 (2.4%) | 7 (4.1%) | 158 (93%) |
| *1*n (%) | | | |

## 3. 10. 0 Recommend a Family member to get vaccinated by District and Residence

| **Characteristic** | **no\_ocv** N = 27*1* | **not\_sure\_ocv** N = 25*1* | **yes\_ocv** N = 734*1* |
| --- | --- | --- | --- |
| district |  |  |  |
| Balaka | 1 (2.94%) | 1 (2.94%) | 32 (94.12%) |
| Blantyre | 6 (4.62%) | 5 (3.85%) | 119 (91.54%) |
| Dedza | 5 (4.76%) | 3 (2.86%) | 97 (92.38%) |
| Lilongwe | 6 (2.04%) | 8 (2.72%) | 280 (95.24%) |
| Mangochi | 3 (2.36%) | 5 (3.94%) | 119 (93.70%) |
| Nkhatabay | 3 (8.33%) | 0 (0.00%) | 33 (91.67%) |
| Salima | 3 (5.00%) | 3 (5.00%) | 54 (90.00%) |
| residence |  |  |  |
| In land | 17 (3.21%) | 16 (3.02%) | 496 (93.76%) |
| lake shore | 10 (3.89%) | 9 (3.50%) | 238 (92.61%) |
| *1*n (%) | | | |

## 3. 13. 0 Prefer ways to Receive Information about Vaccine by Sex, Age Group and Education and Religious

## 3. 13. 1 Prefer ways to Receive Information about Vaccine by District and Residence

# 4. 0 . Availability and use of sanitary services and infrastructure for cholera prevention

## Percentage of households that have toilets by District and residence

## 4 missing rows in the "toilet\_facility\_avaiable" column have been removed.

| **Characteristic** | **available** N = 742*1* | **not\_available** N = 49*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 31 (91.2%) | 3 (8.8%) |
| Blantyre | 119 (91.5%) | 11 (8.5%) |
| Dedza | 100 (95.2%) | 5 (4.8%) |
| Lilongwe | 280 (94.6%) | 16 (5.4%) |
| Mangochi | 117 (90.7%) | 12 (9.3%) |
| Nkhatabay | 35 (97.2%) | 1 (2.8%) |
| Salima | 60 (98.4%) | 1 (1.6%) |
| residence |  |  |
| In land | 499 (94.0%) | 32 (6.0%) |
| lake shore | 243 (93.5%) | 17 (6.5%) |
| *1*n (%) | | |

## ## Percentage of households that have toilets by demographic variables

## 4 missing rows in the "toilet\_facility\_avaiable" column have been removed.

| **Characteristic** | **available** N = 742*1* | **not\_available** N = 49*1* |
| --- | --- | --- |
| sex |  |  |
| female | 565 (93.7%) | 38 (6.3%) |
| male | 177 (94.1%) | 11 (5.9%) |
| level\_education |  |  |
| none | 96 (88.9%) | 12 (11.1%) |
| primary | 464 (93.7%) | 31 (6.3%) |
| secondary | 164 (96.5%) | 6 (3.5%) |
| tertiary | 18 (100.0%) | 0 (0.0%) |
| ethnicity |  |  |
| chewa | 366 (94.3%) | 22 (5.7%) |
| lomwe | 62 (95.4%) | 3 (4.6%) |
| ngonde | 4 (100.0%) | 0 (0.0%) |
| ngoni | 96 (95.0%) | 5 (5.0%) |
| nyanja | 12 (85.7%) | 2 (14.3%) |
| other\_enthni | 8 (88.9%) | 1 (11.1%) |
| sena | 3 (100.0%) | 0 (0.0%) |
| tonga | 23 (95.8%) | 1 (4.2%) |
| tumbuka | 11 (100.0%) | 0 (0.0%) |
| yao | 157 (91.3%) | 15 (8.7%) |
| *1*n (%) | | |

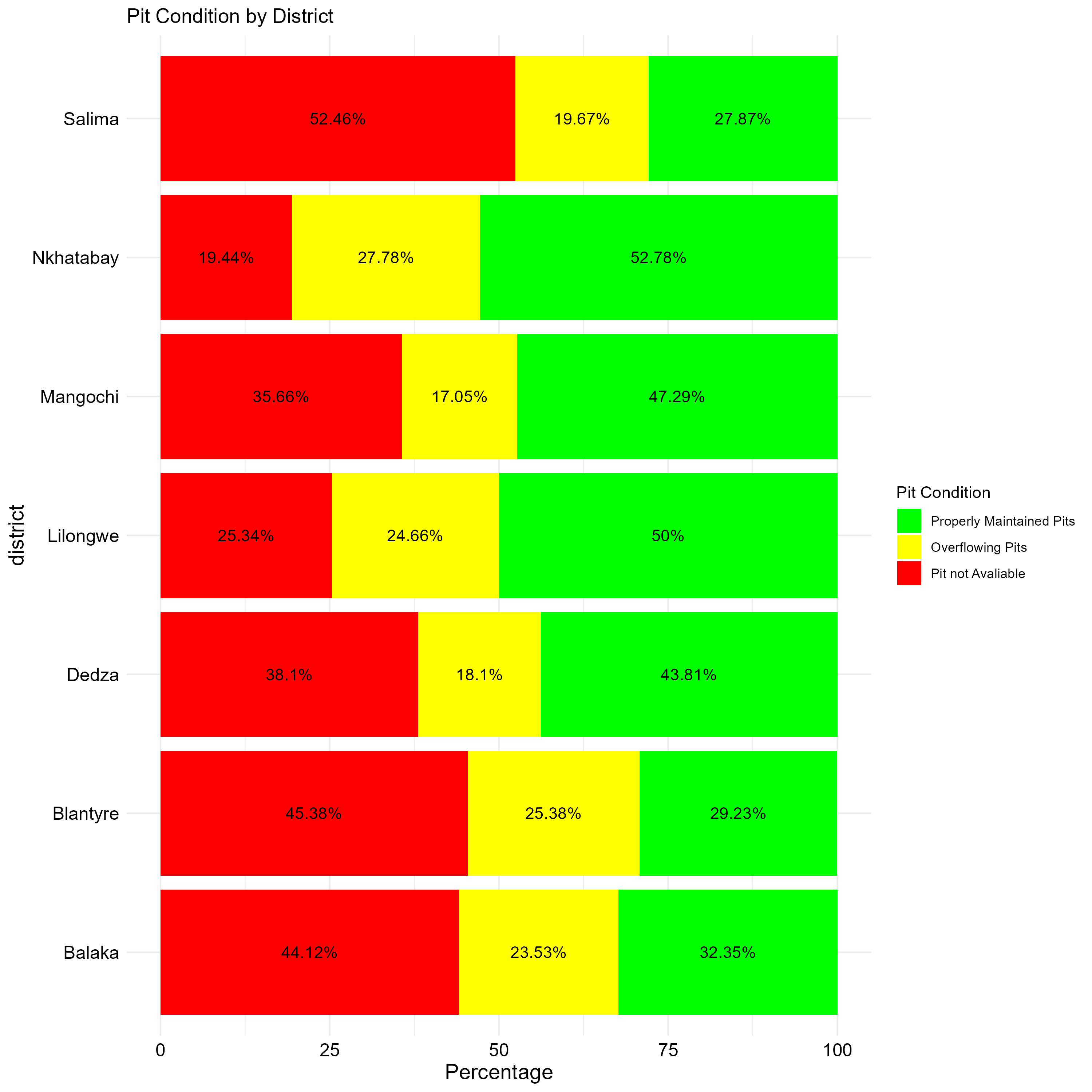
## 3. Availability of Refuse pit by district and residence

## 4 missing rows in the "soild\_waste\_disposal" column have been removed.

| **Characteristic** | **available** N = 473*1* | **not\_available** N = 318*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 18 (52.9%) | 16 (47.1%) |
| Blantyre | 66 (50.8%) | 64 (49.2%) |
| Dedza | 61 (58.1%) | 44 (41.9%) |
| Lilongwe | 196 (66.2%) | 100 (33.8%) |
| Mangochi | 73 (56.6%) | 56 (43.4%) |
| Nkhatabay | 28 (77.8%) | 8 (22.2%) |
| Salima | 31 (50.8%) | 30 (49.2%) |
| residence |  |  |
| In land | 323 (60.8%) | 208 (39.2%) |
| lake shore | 150 (57.7%) | 110 (42.3%) |
| *1*n (%) | | |

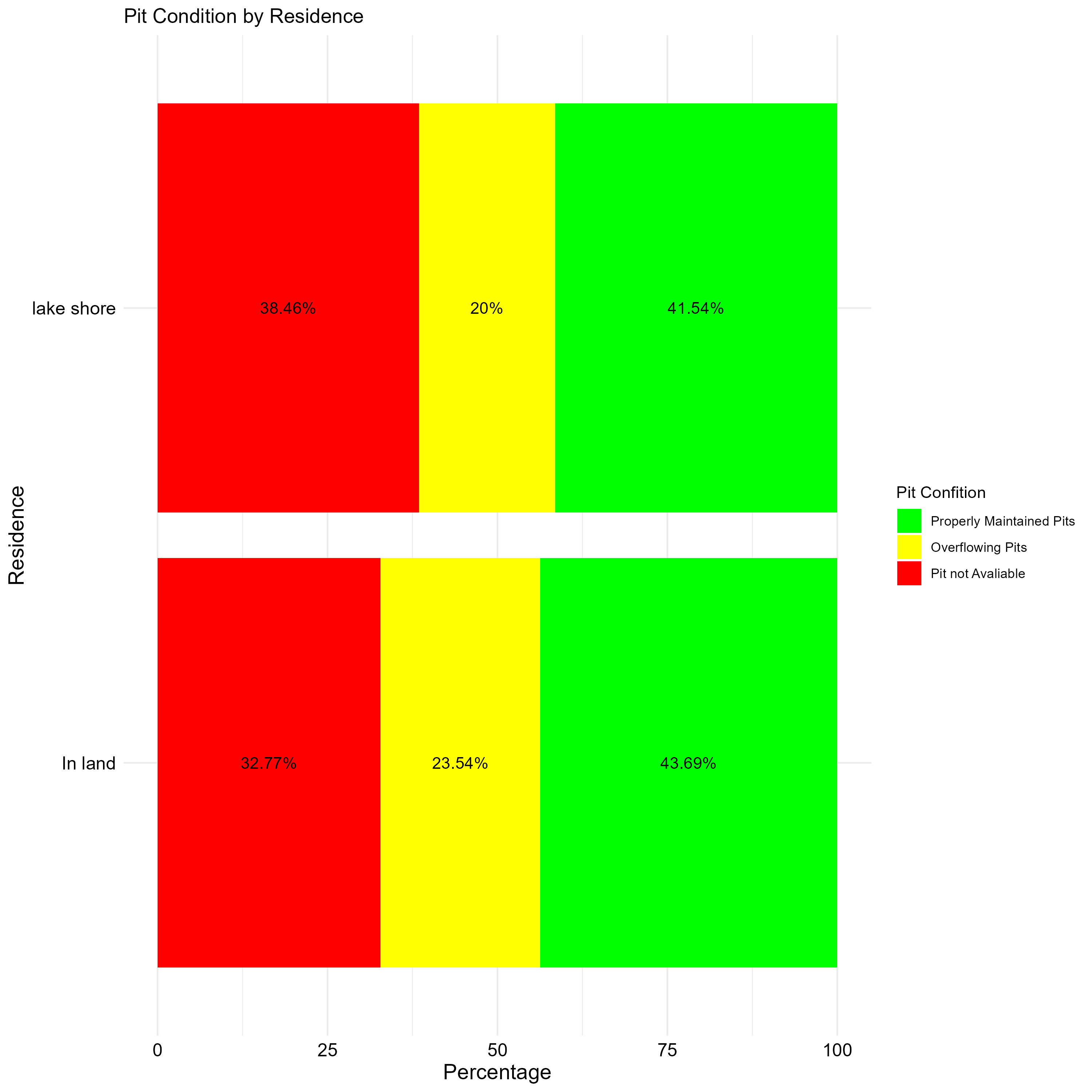
## 5. the pit latrine Condtion by District?

## `summarise()` has grouped output by 'district'. You can override using the  
## `.groups` argument.



## 6. Pit condition by residence

## `summarise()` has grouped output by 'residence'. You can override using the  
## `.groups` argument.



## 7. How often do you wash hands with soap after using the toilet or handling food?

## 8. Availability of handwashing facility by district and residence

## 4 missing rows in the "household\_handwashing\_facility" column have been  
## removed.

| **Characteristic** | **available** N = 240*1* | **not\_available** N = 551*1* |
| --- | --- | --- |
| district |  |  |
| Balaka | 5 (14.7%) | 29 (85.3%) |
| Blantyre | 26 (20.0%) | 104 (80.0%) |
| Dedza | 22 (21.0%) | 83 (79.0%) |
| Lilongwe | 97 (32.8%) | 199 (67.2%) |
| Mangochi | 56 (43.4%) | 73 (56.6%) |
| Nkhatabay | 11 (30.6%) | 25 (69.4%) |
| Salima | 23 (37.7%) | 38 (62.3%) |
| residence |  |  |
| In land | 145 (27.3%) | 386 (72.7%) |
| lake shore | 95 (36.5%) | 165 (63.5%) |
| *1*n (%) | | |

## 8. Availability of handwashing facility by demographic variables

## 4 missing rows in the "household\_handwashing\_facility" column have been  
## removed.

| **Characteristic** | **available** N = 240*1* | **not\_available** N = 551*1* |
| --- | --- | --- |
| sex |  |  |
| female | 183 (30.3%) | 420 (69.7%) |
| male | 57 (30.3%) | 131 (69.7%) |
| age\_group |  |  |
| >50 | 51 (29.5%) | 122 (70.5%) |
| 18-30 | 93 (32.4%) | 194 (67.6%) |
| 31-50 | 96 (29.0%) | 235 (71.0%) |
| level\_education |  |  |
| none | 31 (28.7%) | 77 (71.3%) |
| primary | 150 (30.3%) | 345 (69.7%) |
| secondary | 54 (31.8%) | 116 (68.2%) |
| tertiary | 5 (27.8%) | 13 (72.2%) |
| religion |  |  |
| Christianity | 170 (28.9%) | 418 (71.1%) |
| muslim | 67 (37.4%) | 112 (62.6%) |
| others\_regligion | 3 (12.5%) | 21 (87.5%) |
| ethnicity |  |  |
| chewa | 120 (30.9%) | 268 (69.1%) |
| lomwe | 17 (26.2%) | 48 (73.8%) |
| ngonde | 2 (50.0%) | 2 (50.0%) |
| ngoni | 19 (18.8%) | 82 (81.2%) |
| nyanja | 1 (7.1%) | 13 (92.9%) |
| other\_enthni | 1 (11.1%) | 8 (88.9%) |
| sena | 1 (33.3%) | 2 (66.7%) |
| tonga | 7 (29.2%) | 17 (70.8%) |
| tumbuka | 5 (45.5%) | 6 (54.5%) |
| yao | 67 (39.0%) | 105 (61.0%) |
| *1*n (%) | | |

## 9. if san facilities is not available. how people manage by district

| **Characteristic** | **neighbors\_sanitary** N = 441*1* | **other\_management** N = 42*1* | **they\_go\_to\_bush** N = 312*1* |
| --- | --- | --- | --- |
| district |  |  |  |
| Balaka | 17 (50.0%) | 2 (5.9%) | 15 (44.1%) |
| Blantyre | 65 (50.0%) | 8 (6.2%) | 57 (43.8%) |
| Dedza | 70 (66.7%) | 4 (3.8%) | 31 (29.5%) |
| Lilongwe | 168 (56.0%) | 8 (2.7%) | 124 (41.3%) |
| Mangochi | 80 (62.0%) | 16 (12.4%) | 33 (25.6%) |
| Nkhatabay | 16 (44.4%) | 2 (5.6%) | 18 (50.0%) |
| Salima | 25 (41.0%) | 2 (3.3%) | 34 (55.7%) |
| residence |  |  |  |
| In land | 303 (56.6%) | 20 (3.7%) | 212 (39.6%) |
| lake shore | 138 (53.1%) | 22 (8.5%) | 100 (38.5%) |
| *1*n (%) | | | |

## facilities is not available. how people manage by demographic variables

| **Characteristic** | **neighbors\_sanitary** N = 441*1* | **other\_management** N = 42*1* | **they\_go\_to\_bush** N = 312*1* |
| --- | --- | --- | --- |
| sex |  |  |  |
| female | 346 (57.0%) | 27 (4.4%) | 234 (38.6%) |
| male | 95 (50.5%) | 15 (8.0%) | 78 (41.5%) |
| age\_group |  |  |  |
| >50 | 102 (58.6%) | 10 (5.7%) | 62 (35.6%) |
| 18-30 | 164 (56.7%) | 14 (4.8%) | 111 (38.4%) |
| 31-50 | 175 (52.7%) | 18 (5.4%) | 139 (41.9%) |
| level\_education |  |  |  |
| none | 57 (52.8%) | 9 (8.3%) | 42 (38.9%) |
| primary | 290 (58.1%) | 27 (5.4%) | 182 (36.5%) |
| secondary | 86 (50.6%) | 5 (2.9%) | 79 (46.5%) |
| tertiary | 8 (44.4%) | 1 (5.6%) | 9 (50.0%) |
| ethnicity |  |  |  |
| chewa | 225 (57.4%) | 13 (3.3%) | 154 (39.3%) |
| lomwe | 32 (49.2%) | 4 (6.2%) | 29 (44.6%) |
| ngonde | 2 (50.0%) | 0 (0.0%) | 2 (50.0%) |
| ngoni | 54 (53.5%) | 4 (4.0%) | 43 (42.6%) |
| nyanja | 9 (64.3%) | 1 (7.1%) | 4 (28.6%) |
| other\_enthni | 6 (66.7%) | 0 (0.0%) | 3 (33.3%) |
| sena | 2 (66.7%) | 1 (33.3%) | 0 (0.0%) |
| tonga | 9 (37.5%) | 3 (12.5%) | 12 (50.0%) |
| tumbuka | 6 (54.5%) | 0 (0.0%) | 5 (45.5%) |
| yao | 96 (55.8%) | 16 (9.3%) | 60 (34.9%) |
| *1*n (%) | | | |

## Common reasons for not using available sanitary facilities by District and residence

| **Characteristic** | **Cost** N = 173*1* | **Distance** N = 50*1* | **Poor Maintenance Unhygienic** N = 321*1* |
| --- | --- | --- | --- |
| district |  |  |  |
| Balaka | 7 (4.0%) | 0 (0.0%) | 14 (4.4%) |
| Blantyre | 33 (19.1%) | 9 (18.0%) | 55 (17.1%) |
| Dedza | 18 (10.4%) | 8 (16.0%) | 44 (13.7%) |
| Lilongwe | 57 (32.9%) | 19 (38.0%) | 126 (39.3%) |
| Mangochi | 36 (20.8%) | 4 (8.0%) | 38 (11.8%) |
| Nkhatabay | 10 (5.8%) | 5 (10.0%) | 14 (4.4%) |
| Salima | 12 (6.9%) | 5 (10.0%) | 30 (9.3%) |
| residence |  |  |  |
| In land | 108 (62.4%) | 36 (72.0%) | 225 (70.1%) |
| lake shore | 65 (37.6%) | 14 (28.0%) | 96 (29.9%) |
| *1*n (%) | | | |