data_visualization_project

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ASER Pakistan Data Visualization Project

1. Introduction

Despite being the fifth most populous country in the world, Pakistan is only able to spend as much as 1.7 percent of its GDP on education. The tumultuous domestic political climate, in conjunction with the global geopolitical landscape, has undeniably resulted in a series of macroeconomic crises within the nation. These crises have unfortunately led to widespread inflation, a rise in poverty, and a profound literacy crisis that poses significant challenges for future generations. A sizable children population (around 26 million) remains out of school which can have devastating impact on the opportunities of the country to grow out of these crises.

In recent times, the World Bank has observed that Pakistan's Human Capital Index (HCI) has dropped to 0.41, making it lower than other South Asian peers. Hence, as researchers, there is a need for greater critical understanding about rectifying and remedying the problems at hand. Rather than focusing on all-encompassing solutions, more data-driven, targeted approaches are required to provide stability to the educational sector.

2. Data

In light of this, the ASER Pakistan's 2023 Report (https://aserpakistan.org/report) and its data set (https://aserpakistan.org/index.php?func=data_statistics) provides valuable, and up to date insights into the household data, school related information, and children's literacy through testing. The ASER Pakistan works as a private, non-profit think-tank but receives development funding through the government and other international non-governmental organizations to conduct a sample survey across 123 urban districts and 151 rural districts in Pakistan. The 2023 data shows that they reached out to 272,300 children to conduct their foundational literacy and proficiency tests. The ASER data sets used in this assignment and class contain observations of only rural areas of Pakistan. Since the data is collected from a sample of rural areas, the findings are not generalizable to the entire population of Pakistan. Similarly, since the data is merged across three subsets, the number of variables and observations may vary in the cleaning process by removing missing values and other inconsistencies.

3. Research Questions

The ASER Pakistan data set provides a wealth of information about the educational landscape in rural Pakistan. In this project, my primary focus is to relate the surveyed children to their households and schools. In this way, we can better understand the relational aspects of household factors and school characteristics that may influence the educational outcomes of children.

The following research questions will be addressed in this project:

1. What is the distribution of children enrolled in government and private schools in rural areas?
2. What is the proportion of co-educational schools versus single-gender schools in rural areas?
3. How does the proportion of psychological impact vary based on the severity of flood impact in rural areas?

4. How does the awareness of climate change influence the proportion of households experiencing an earning impact in rural areas?
5. What is the distribution of arithmetic levels by the medium of instruction for the first five grades in rural areas?

3.1 Variables of Interest

The variables of interest for this project include:

Variable Name	Description
HHID	Household Identification Number
VMAPID	Village/Urban Mapping Identification Number
Id	Unique Identifier for Child
AREA	Geographic Area (Rural/Urban)
RNAME	Region Name
DNAME	District Name
HouseType	Type of Housing (e.g., Owned, Rented)
HouseholdCounter	Number of Household Members
EarningMembers	Number of Earning Members in Household
Car	Household Car Ownership (Yes/No)
MotorCycle	Household Motorcycle Ownership (Yes/No)
TravelTime	Time taken to reach school (in minutes)
ClimateChange	Awareness of Climate Change (Informed/Uninformed)
FloodImpacted	Impact of Flood on Household (Yes/No)
EarningImpacted	Impact of Climate Change on Household Earnings (% change)
PsychologicalImpacted	Psychological Impact of Climate Change (Substantially/Somewhat)
SchoolingAffected	Impact of Climate Change on Schooling (Extremely/Moderately)
SchoolType	Type of School (Government/Private)
TeachersAppointed	Number of Teachers Appointed
TeachersPresent	Number of Teachers Present
SingleOrCoEdSchool	School Type (Single-sex/Co-educational)
InstructionMedium	Medium of Instruction (English/Urdu/Sindhi)
ChildrenEnrolled	Number of Children Enrolled in School
ChildrenPresent	Number of Children Present in School
VCODES	Village/Urban Codes

Variable Name	Description
EducationalStatus	Educational Status of Child (Enrolled/Dropout)
SurveyedChildToSchool	Surveyed Child's School Attendance (Yes/No)
Grades	Child's Current Grade Level
InstitutionType	Type of Educational Institution (Government/Private)
LocalLangReadingLevel	Child's Reading Level in Local Language (Beginner/Advanced)
ArithmeticLevel	Child's Arithmetic Level (Basic/Advanced)
EnglishReadingLevel	Child's English Reading Level (Beginner/Advanced)

4. Data Cleaning and Preparation

The data cleaning and preparation process for this project involves loading the three datasets (school, child, and household) into R, renaming some column names to make them consistent, merging them, selecting the relevant columns, filtering out the missing values, making data types consistent such as integer, character or factor, and recoding variables into *CamelCase* for better understanding. The data cleaning and preparation process is crucial for ensuring that the data is ready for analysis and visualization.

4.1 Loading the Data

```
library(tidyverse)
```

```
## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
## ✓ dplyr     1.1.4     ✓ readr     2.1.5
## ✓ forcats   1.0.0     ✓ stringr   1.5.1
## ✓ ggplot2   3.5.1     ✓ tibble    3.2.1
## ✓ lubridate 1.9.3     ✓ tidyr     1.3.1
## ✓ purrr     1.0.2
## ── Conflicts ────────────────────────────────────── tidyverse_conflicts() ──
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts
to become errors
```

```
library(readxl)
library(see)
# Loading the three datasets into R
aser_child <- read.csv("ITAASER2023Child.csv")
aser_household <- read.csv("ITAASER2023Household.csv") %>%
  rename(HHID = HouseholdId) %>% # Renaming the HouseholdId column to HHID for merging w
ith the Child Dataset
  rename(VMAPID = VillageMapSurveyId) # Renaming the VillageMapSurveyId column to VMAPID
for merging with the School Dataset
aser_school <- read.csv("ITAASER2023School.csv")

glimpse(aser_child)
```

```
## Rows: 214,014
## Columns: 47
## $ Id           <int> 1532002, 1532003, 1532004, 1532005, 1532006, 1532007, 15…
## $ RNAME        <chr> "PUNJAB", "PUNJAB", "PUNJAB", "PUNJAB", "PUNJAB", "PUNJA…
## $ PrvCode      <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,…
## $ DNAME        <chr> "VEHARI", "VEHARI", "VEHARI", "VEHARI", "VEHARI", "VEHAR…
## $ DstCode      <int> 35, 35, 35, 35, 35, 35, 35, 35, 35, 35, 35, 35, 35, 35, …
## $ VCODES       <int> 6578, 6578, 6578, 6578, 6578, 6578, 6578, 6579, 6579, 65…
## $ C03          <int> 11, 7, 4, 4, 12, 8, 7, 14, 11, 7, 15, 13, 10, 5, 9, 7, 5…
## $ C04          <int> 1, 1, NA, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, NA, …
## $ C05          <int> 3, 3, NA, NA, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, …
## $ C06          <chr> "7", "2", "", "", "5", "2", "2", "8", "", "", "9", "8", …
## $ C08          <chr> "NULL", "NULL", "NULL", "NULL", "12", "NULL", "NULL", "N…
## $ C09          <chr> "NULL", "NULL", "NULL", "NULL", "NULL", "NULL", "NULL", …
## $ C10          <chr> "7", "3", "ECE", "ECE", "7", "4", "3", "", "7", "3", "11…
## $ C11          <int> 1, 2, NA, NA, 2, 2, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, …
## $ C12          <int> 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0,…
## $ C07          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…
## $ C13          <int> 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1,…
## $ C14          <chr> "500", "300", "NULL", "NULL", "900", "800", "1000", "700…
## $ C15          <int> 3, 2, NA, NA, 4, 3, 3, 5, NA, 4, NA, NA, NA, NA, NA, 2, …
## $ C16          <int> NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, N…
## $ B17          <int> NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, N…
## $ C18          <int> 1, 1, NA, NA, 1, 1, 1, 1, NA, 1, 1, 1, NA, 1, 1, 1, 1, 1…
## $ C19          <int> 7, 5, NA, NA, 6, 5, 6, 7, NA, 6, 7, 7, NA, 1, 2, 3, 2, 7…
## $ C23          <int> 1, 1, NA, NA, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, …
## $ C24          <int> 0, 0, NA, NA, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, …
## $ C25          <int> 0, 0, NA, NA, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, …
## $ C20          <int> 4, 3, NA, NA, 5, 4, 3, 5, NA, 4, 5, 4, NA, 1, 3, 4, 1, 5…
## $ C21          <int> 1, NA, NA, NA, 1, 1, NA, 1, 0, 1, 1, 1, 0, NA, NA, 1, NA…
## $ C22          <int> NA, NA, NA, NA, 1, NA, NA, 1, 0, NA, 1, NA, 0, NA, NA, N…
## $ C26a         <int> 0, NA, NA, NA, 0, 0, NA, 1, 0, 1, 0, 0, 0, NA, NA, 1, NA…
## $ C26b         <int> 1, NA, NA, NA, 0, 0, NA, 1, 0, 0, 0, 0, 0, NA, NA, 1, NA…
## $ C27          <int> 1, NA, NA, NA, 1, 1, NA, 1, 0, 1, 1, 0, 0, NA, NA, 1, NA…
## $ PRID         <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,…
## $ ICH01        <int> 2, 1, 2, 1, 1, 2, 1, 2, 1, 3, 3, 2, 3, 1, 1, 1, 1, 2,…
## $ ICH02        <chr> "Other", "Allergies", "Other", "Other", "Allergies", "Ot…
## $ ICH03        <int> 1, 1, 2, 1, 1, 1, 2, 1, 2, 2, 3, 1, 1, 1, 1, 1, 1, 1,…
## $ ICH05        <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,…
## $ BasicVaccines <chr> "All vaccines", "All vaccines", "All vaccines", "All vac…
## $ Allergies    <chr> "NULL", "NULL", "NULL", "NULL", "NULL", "NULL", "NULL", …
## $ C28          <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ Polio        <int> 1, 1, 1, 1, 1, 1, 1, 1, NA, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ DPT_HepB_Hib <int> 1, 1, 1, 1, 1, 1, 1, 1, NA, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Pneumococcal <int> 1, 1, 1, 1, 1, 1, 1, 1, NA, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Measles      <int> 1, 1, 1, 1, 1, 1, 1, 1, NA, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ BCG          <int> 1, 1, 1, 1, 1, 1, 1, 1, NA, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ AREA         <chr> "rural", "rural", "rural", "rural", "rural", "rural", "r…
## $ HHID         <int> 1365063, 1365063, 1365063, 1365064, 1365065, 1365065, 13…
```

```
summary(aser_child)
```

```
##        Id               RNAME              PrvCode            DNAME
##  Min.   :1532002   Length:214014      Min.   :1.00     Length:214014
##  1st Qu.:2533318   Class :character   1st Qu.:2.00     Class :character
##  Median :2603819   Mode  :character   Median :3.00     Mode  :character
##  Mean   :2377380                      Mean   :2.99
##  3rd Qu.:2657391                      3rd Qu.:4.00
##  Max.   :2764055                      Max.   :7.00
##
##     DstCode           VCODES              C03              C04
##  Min.   :  1.00   Min.   :    1    Min.   : 3.000   Min.   :0.0000
##  1st Qu.: 42.00   1st Qu.: 1461    1st Qu.: 6.000   1st Qu.:0.0000
##  Median : 78.00   Median : 2943    Median : 9.000   Median :0.0000
##  Mean   : 78.46   Mean   : 3825    Mean   : 8.941   Mean   :0.4683
##  3rd Qu.:113.00   3rd Qu.: 4510    3rd Qu.:12.000   3rd Qu.:1.0000
##  Max.   :179.00   Max.   :22818    Max.   :16.000   Max.   :2.0000
##                                    NA's   :758      NA's   :1477
##      C05              C06               C08                C09
##  Min.   :1.000   Length:214014     Length:214014      Length:214014
##  1st Qu.:3.000   Class :character  Class :character   Class :character
##  Median :3.000   Mode  :character  Mode  :character   Mode  :character
##  Mean   :2.611
##  3rd Qu.:3.000
##  Max.   :3.000
##  NA's   :1478
##      C10               C11              C12               C07
##  Length:214014    Min.   :1.00     Min.   :0.00     Min.   :0.00
##  Class :character 1st Qu.:1.00     1st Qu.:0.00     1st Qu.:0.00
##  Mode  :character Median :1.00     Median :0.00     Median :0.00
##                   Mean   :1.26     Mean   :0.43     Mean   :0.06
##                   3rd Qu.:1.00     3rd Qu.:1.00     3rd Qu.:0.00
##                   Max.   :4.00     Max.   :1.00     Max.   :1.00
##                   NA's   :46694    NA's   :43307    NA's   :44223
##      C13              C14               C15               C16
##  Min.   :0.0     Length:214014     Min.   :1.00     Min.   :0.00
##  1st Qu.:0.0     Class :character  1st Qu.:2.00     1st Qu.:1.00
##  Median :0.0     Mode  :character  Median :3.00     Median :1.00
##  Mean   :0.1                       Mean   :3.27     Mean   :0.93
##  3rd Qu.:0.0                       3rd Qu.:5.00     3rd Qu.:1.00
##  Max.   :1.0                       Max.   :5.00     Max.   :1.00
##  NA's   :45575                     NA's   :61025    NA's   :165959
##      B17              C18               C19               C23
##  Min.   :0.00    Min.   :1.0      Min.   :1.00     Min.   :0.00
##  1st Qu.:1.00    1st Qu.:1.0      1st Qu.:2.00     1st Qu.:0.00
##  Median :1.00    Median :1.0      Median :4.00     Median :1.00
##  Mean   :0.92    Mean   :1.1      Mean   :4.23     Mean   :0.51
##  3rd Qu.:1.00    3rd Qu.:1.0      3rd Qu.:7.00     3rd Qu.:1.00
##  Max.   :1.00    Max.   :2.0      Max.   :7.00     Max.   :1.00
##  NA's   :165982  NA's   :61163    NA's   :60253    NA's   :67180
##      C24              C25               C20               C21
##  Min.   :0.00    Min.   :0.00     Min.   :1.00     Min.   :0.00
##  1st Qu.:0.00    1st Qu.:0.00     1st Qu.:2.00     1st Qu.:0.00
##  Median :0.00    Median :0.00     Median :4.00     Median :1.00
```

```
##   Mean   :0.41    Mean   :0.39    Mean   :3.29    Mean    :0.53
##   3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:5.00    3rd Qu.:1.00
##   Max.   :1.00    Max.   :1.00    Max.   :5.00    Max.    :1.00
##   NA's   :67760   NA's   :68043   NA's   :61196   NA's    :110326
##       C22             C26a            C26b            C27
##   Min.   :0.00    Min.   :0.00    Min.   :0.0     Min.   :0.00
##   1st Qu.:0.00    1st Qu.:0.00    1st Qu.:0.0     1st Qu.:0.00
##   Median :1.00    Median :1.00    Median :0.0     Median :1.00
##   Mean   :0.52    Mean   :0.52    Mean   :0.5     Mean   :0.53
##   3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:1.0     3rd Qu.:1.00
##   Max.   :1.00    Max.   :1.00    Max.   :1.0     Max.   :1.00
##   NA's   :131441  NA's   :108372  NA's   :108919  NA's   :109410
##       PRID            ICH01           ICH02              ICH03
##   Min.   : 1.00   Min.   :1.000   Length:214014   Min.   :1.00
##   1st Qu.: 1.00   1st Qu.:1.000   Class :character   1st Qu.:1.00
##   Median : 1.00   Median :2.000   Mode  :character   Median :2.00
##   Mean   : 1.01   Mean   :1.974                      Mean   :2.32
##   3rd Qu.: 1.00   3rd Qu.:3.000                      3rd Qu.:4.00
##   Max.   :20.00   Max.   :5.000                      Max.   :4.00
##   NA's   :161836  NA's   :15297                      NA's   :36521
##       ICH05        BasicVaccines     Allergies           C28
##   Min.   :0.000   Length:214014   Length:214014   Min.   :0.00
##   1st Qu.:0.000   Class :character   Class :character   1st Qu.:0.00
##   Median :0.000   Mode  :character   Mode  :character   Median :0.00
##   Mean   :0.175                                      Mean   :0.15
##   3rd Qu.:0.000                                      3rd Qu.:0.00
##   Max.   :1.000                                      Max.   :1.00
##   NA's   :20746                                      NA's   :66966
##       Polio        DPT_HepB_Hib    Pneumococcal       Measles
##   Min.   :1       Min.   :1       Min.   :1       Min.   :1
##   1st Qu.:1       1st Qu.:1       1st Qu.:1       1st Qu.:1
##   Median :1       Median :1       Median :1       Median :1
##   Mean   :1       Mean   :1       Mean   :1       Mean   :1
##   3rd Qu.:1       3rd Qu.:1       3rd Qu.:1       3rd Qu.:1
##   Max.   :1       Max.   :1       Max.   :1       Max.   :1
##   NA's   :67401   NA's   :103281  NA's   :101573  NA's   :98725
##       BCG             AREA            HHID
##   Min.   :1       Length:214014   Min.   :1365063
##   1st Qu.:1       Class :character   1st Qu.:2365537
##   Median :1       Mode  :character   Median :2404322
##   Mean   :1                       Mean   :2169913
##   3rd Qu.:1                       3rd Qu.:2423130
##   Max.   :1                       Max.   :2500560
##   NA's   :96075
```

```
str(aser_household)
```

```
## 'data.frame':    89602 obs. of  58 variables:
##  $ HHID                         : int  1411380 1374733 1375159 1375161 1375166 137
5168 1375173 1375214 1375217 1375221 ...
##  $ VMAPID                       : int  30042 30055 30055 30055 30055 30055 30055 3
0055 30055 30055 ...
##  $ HouseholdCounter             : int  20 20 2 3 4 5 6 7 8 9 ...
##  $ IsFamilyHead                 : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Gender                       : int  1 1 1 NA NA 2 1 1 NA NA ...
##  $ MaleMembers                  : int  3 4 4 6 1 3 1 3 6 4 ...
##  $ FemaleMembers                : int  2 2 2 2 1 1 1 1 3 3 ...
##  $ EarningMembers               : int  2 3 1 3 1 1 1 1 2 1 ...
##  $ EarningMembersChild          : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ HouseType                    : int  2 1 2 2 1 2 1 1 2 2 ...
##  $ IsHouseOwned                 : int  1 0 1 0 0 0 0 0 0 0 ...
##  $ IsElectricityConnectionAvailable: int  1 1 1 1 1 1 1 1 1 1 ...
##  $ IsTVAvailable                : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsRadioAvailable             : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsMobileAvailable            : int  1 0 0 0 0 0 0 0 0 0 ...
##  $ IsSmartPhoneAvailable        : int  0 1 1 1 1 1 1 1 1 1 ...
##  $ Car                          : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ MotorCycle                   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ IsInternetAvailable          : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsComputerAvailable          : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsSolarPanelAvailable        : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ UseSms                       : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ UseWhatsApp                  : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsRecipientBISP              : int  1 1 0 0 0 0 1 0 1 0 ...
##  $ IsRecipientPSPA              : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsRecipientAkhuwat           : int  0 0 0 0 0 1 0 0 0 0 ...
##  $ IsRecipientEhsaas            : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsRecipientOther             : int  0 0 1 1 0 0 0 1 0 1 ...
##  $ TotalFuctionalToilets        : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ IsTap                        : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsBore                       : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsFilter                     : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsToba                       : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsChashma                    : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsOther                      : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ IsToiletAvailable            : chr  "1" "1" "1" "1" ...
##  $ CarOther                     : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ UsedComputer                 : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ UsedSmartPhone               : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ ReadNewsPaper                : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ LearningPlatforms            : int  1 3 3 3 NA NA 3 3 3 1 ...
##  $ FloodsAffected               : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ MigrantIDP                   : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ ClimateChange                : int  2 2 2 2 NA NA 2 2 2 2 ...
##  $ FloodImpacted                : int  3 3 3 3 NA NA NA 3 3 3 ...
##  $ EarningImpacted              : int  5 5 5 5 NA NA NA 5 5 5 ...
##  $ PsychologicalImpacted        : int  4 4 4 4 4 4 4 4 4 4 ...
##  $ TravelMode                   : logi  NA NA NA NA NA NA ...
##  $ TravelTime                   : int  NA NA NA NA NA NA NA NA NA NA ...
```

```
##  $ NadraRegistration           : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ FormBRegistration           : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ ChangeSchool                : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ ChangeSchoolReason          : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ EducationExpense            : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ SchoolingAffected           : int  NA 4 4 NA 4 NA NA NA NA NA ...
##  $ MotherLanguage              : chr  "Urdu" "" "Urdu" "Urdu" ...
##  $ Religion                    : chr  "" "Islam" "" "" ...
##  $ FunctionalToilet            : int  NA NA NA NA NA NA NA NA NA NA ...
```

```
glimpse(aser_household)
```

```
## Rows: 89,602
## Columns: 58
## $ HHID                             <int> 1411380, 1374733, 1375159, 1375161, 1…
## $ VMAPID                           <int> 30042, 30055, 30055, 30055, 30055, 30…
## $ HouseholdCounter                 <int> 20, 20, 2, 3, 4, 5, 6, 7, 8, 9, 11, 1…
## $ IsFamilyHead                     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ Gender                           <int> 1, 1, 1, NA, NA, 2, 1, 1, NA, NA, 2, …
## $ MaleMembers                      <int> 3, 4, 4, 6, 1, 3, 1, 3, 6, 4, 3, 1, 2…
## $ FemaleMembers                    <int> 2, 2, 2, 2, 1, 1, 1, 1, 3, 3, 2, 1, 2…
## $ EarningMembers                   <int> 2, 3, 1, 3, 1, 1, 1, 1, 2, 1, 1, 1, 2…
## $ EarningMembersChild              <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ HouseType                        <int> 2, 1, 2, 2, 1, 2, 1, 1, 2, 2, 1, 2, 1…
## $ IsHouseOwned                     <int> 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsElectricityConnectionAvailable <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ IsTVAvailable                    <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRadioAvailable                 <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsMobileAvailable                <int> 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsSmartPhoneAvailable            <int> 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Car                              <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ MotorCycle                       <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ IsInternetAvailable              <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsComputerAvailable              <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsSolarPanelAvailable            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ UseSms                           <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ UseWhatsApp                      <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientBISP                  <int> 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0…
## $ IsRecipientPSPA                  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientAkhuwat               <int> 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1…
## $ IsRecipientEhsaas                <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientOther                 <int> 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 0…
## $ TotalFuctionalToilets            <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ IsTap                            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsBore                           <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsFilter                         <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsToba                           <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsChashma                        <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsOther                          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsToiletAvailable                <chr> "1", "1", "1", "1", "1", "1", "1", "1…
## $ CarOther                         <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ UsedComputer                     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ UsedSmartPhone                   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ ReadNewsPaper                    <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ LearningPlatforms                <int> 1, 3, 3, 3, NA, NA, 3, 3, 3, 1, NA, 1…
## $ FloodsAffected                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ MigrantIDP                       <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ ClimateChange                    <int> 2, 2, 2, 2, NA, NA, 2, 2, 2, 2, 2, 2,…
## $ FloodImpacted                    <int> 3, 3, 3, 3, NA, NA, NA, 3, 3, 3, 3, 3…
## $ EarningImpacted                  <int> 5, 5, 5, 5, NA, NA, NA, 5, 5, 5, 5, 5…
## $ PsychologicalImpacted            <int> 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, NA, …
## $ TravelMode                       <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ TravelTime                       <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ NadraRegistration                <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
```

```
## $ FormBRegistration        <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ ChangeSchool             <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ ChangeSchoolReason       <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ EducationExpense         <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ SchoolingAffected        <int> NA, 4, 4, NA, 4, NA, NA, NA, NA, NA, …
## $ MotherLanguage           <chr> "Urdu", "", "Urdu", "Urdu", "Urdu", "…
## $ Religion                 <chr> "", "Islam", "", "", "Islam", "", "",…
## $ FunctionalToilet         <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
```

```
glimpse(aser_school)
```

```
## Rows: 6,095
## Columns: 137
## $ SYEAR    <int> 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, 2023, …
## $ AREA     <int> 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, …
## $ VMAPID   <int> 336803, 316762, 336753, 336771, 336805, 316754, 336758, 3367…
## $ RNAME    <chr> "AZAD JAMMU AND KASHMIR                    ", "AZAD …
## $ DNAME    <chr> "BAGH", "BAGH", "BAGH", "BAGH", "BAGH", "BAGH", "BAGH", "BAG…
## $ VlgId    <int> 5010, 5019, 5020, 5001, 5009, 5003, 5004, 5016, 5006, 5011, …
## $ VlgCode  <chr> "10", "19", "20", "1", "9", "3", "4", "16", "6", "11", "7", …
## $ SID      <int> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 1…
## $ STYPE    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S006     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S00      <int> 4, 3, 3, 1, 2, 1, 4, 1, 2, 2, 3, 1, 3, 2, 2, 1, 1, 2, 1, 2, …
## $ S00a     <chr> "N TO 5", "", "", "", "", "", "", "", "", "", "ECE- 10", "NU…
## $ S001     <int> 1, 2, 2, 1, 1, 1, 1, 2, 1, 1, 1, 1, 2, 1, 2, 1, 1, 1, 1, 2, …
## $ S002     <int> 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S002a    <chr> "", "", "", "", "", "", "", "", "", "", "", "", "", "", "", …
## $ S002Y    <int> 2002, 1951, 1949, 1982, 1962, 1980, 1990, 1982, 1960, 1947, …
## $ S007E    <int> 27, 237, 323, 40, 77, 37, 36, 50, 140, 179, 158, 52, 221, 11…
## $ S007P    <int> 27, 224, 301, 33, 75, 33, 36, 45, 129, 179, 158, 52, 206, 10…
## $ S03a1    <int> 1, 1, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 0, NA, 1, 1, 1, 1, 1, 0,…
## $ S03b1    <chr> "3|4", "3", "", "NURSE ONE", "", "N", "2", "", "3", "", "4",…
## $ S03f1    <int> 1, 1, 1, 1, 1, 0, 1, 1, 0, 1, NA, 1, 1, 0, 1, 1, 1, 1, 1, NA…
## $ S03d1    <int> 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S03e1    <int> 1, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S03c1    <int> 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 3, 1, 1, NA, 1, 1, 1, 1, 1, 1,…
## $ S03a2    <int> NA, 0, 0, NA, 0, NA, NA, NA, 0, 0, 1, NA, 0, 0, 1, NA, NA, 0…
## $ S03b2    <chr> "", "", "", "", "", "", "", "", "", "", "6", "", "", "", "",…
## $ S03f2    <int> NA, 1, 0, NA, 1, NA, NA, NA, 1, 1, NA, NA, 1, 1, 0, NA, NA, …
## $ S03d2    <int> NA, 1, 0, NA, 1, NA, NA, NA, 1, 1, 1, NA, 1, 1, 1, NA, NA, 1…
## $ S03e2    <int> NA, 1, 0, NA, 1, NA, NA, NA, 1, 1, 1, NA, 1, 1, 1, NA, NA, 1…
## $ S03c2    <int> NA, 1, 1, NA, 1, NA, NA, NA, 1, NA, NA, NA, NA, NA, 3, NA, N…
## $ S004     <int> 0, 1, 0, 1, 1, 0, NA, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, NA, 0…
## $ S004VB1  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004VB2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004VB3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004VG1  <int> NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, NA, 12, NA, NA, N…
## $ S004VG2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004VG3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HB1  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HB2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HB3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HG1  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HG2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004HG3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004PB1  <int> NA, 2, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, 4, NA, NA, NA,…
## $ S004PB2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004PB3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004PG1  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, N…
## $ S004PG2  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004PG3  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004IB1  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
```

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## $ S004IB2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, N…
## $ S004IB3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004IG1   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004IG2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004IG3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRB1 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRB2 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRB3 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRG1 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRG2 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004SCRG3 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTB1 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTB2 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTB3 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTG1 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTG2 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004COTG3 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S004FR    <int> NA, 0, NA, 0, 0, NA, NA, NA, NA, NA, 0, 0, 1, NA, NA, NA, NA…
## $ S004FT    <int> NA, 0, NA, 1, 1, NA, NA, NA, NA, NA, 0, 0, 1, NA, NA, NA, NA…
## $ S004FHN   <int> NA, 0, NA, 0, 0, NA, NA, NA, NA, NA, 0, 0, 0, NA, NA, NA, NA…
## $ S004TSS   <int> NA, 0, NA, 0, 0, NA, NA, NA, NA, NA, 0, 0, 0, NA, NA, NA, NA…
## $ S004ADHI  <int> NA, 0, NA, 0, 0, NA, NA, NA, NA, NA, 0, 0, 0, NA, NA, NA, NA…
## $ S004TF    <int> NA, 0, NA, 0, 0, NA, NA, NA, NA, NA, 0, 0, 0, NA, NA, NA, NA…
## $ S011Ob1   <int> 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 1, 1, …
## $ S011Ob2   <int> 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, …
## $ S011Ob3   <int> 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S011Ob4   <int> 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, …
## $ S011Ob5   <int> 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, …
## $ S011Ob6   <int> NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S011Ob7   <int> 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S011Ob8   <int> NA, 1, 1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1,…
## $ S011Ob9   <int> 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, …
## $ S011Ob10  <int> NA, 0, NA, NA, NA, NA, NA, NA, NA, NA, 0, NA, NA, NA, NA, NA…
## $ S011Ob11  <int> NA, 2, NA, NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA…
## $ S011Ob12  <int> 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, …
## $ S011Ob13  <int> 0, 0, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, …
## $ S011Ob14  <int> 0, 0, NA, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 1,…
## $ S011Ob15  <int> 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, …
## $ S011Ob16  <int> 0, 1, 1, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1, …
## $ S011Ob17  <int> 0, 0, 1, 1, 1, NA, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 0, 1, 1,…
## $ S011Ob18  <int> 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, …
## $ S011Ob19  <int> 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, …
## $ S011Ob20  <int> 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, …
## $ S012Ob1   <int> 3, 11, 18, 3, 10, 4, 4, 4, 8, 8, 10, 3, 22, 9, 7, 1, 4, 8, 3…
## $ S012Ob2   <int> 2, 9, 15, 2, 9, 3, 3, 3, 6, 8, 8, 2, 22, 7, 5, 1, 3, 5, 3, 9…
## $ S012Ob3   <int> 260, 260, 248, 260, 260, 144, 260, 260, 260, 295, 260, 260, …
## $ S012Ob4   <int> NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, 2, 1, NA, NA, 1, …
## $ S012Ob5   <int> NA, NA, NA, 2, NA, NA, NA, NA, 1, NA, NA, 2, 1, NA, NA, 1, 1…
## $ S012Ob6   <int> NA, NA, 6, 1, 1, NA, NA, NA, NA, NA, NA, 2, NA, NA, NA, NA, …
## $ S012Ob7   <int> NA, NA, 2, 1, NA, NA, NA, NA, NA, NA, NA, NA, 4, NA, 2, 1, 1…
## $ S012Ob8   <int> NA, NA, 3, NA, NA, NA, NA, NA, NA, NA, NA, 3, NA, NA, NA, NA…
## $ S012Ob11  <int> NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, NA, 2, NA, NA, NA, 1,…
```

```
## $ S012Ob12  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, NA, 0, 0, 0, 0,…
## $ S012Ob13  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, NA, 0, 0, 0, 0,…
## $ S012Ob14  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S012Ob15  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S012Ob16  <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S008TA    <int> 3, 13, 17, 3, 8, 3, 3, 3, 9, 8, 19, 4, 23, 5, 7, 3, 3, 8, 5,…
## $ S008TP    <int> 3, 13, 16, 2, 6, 2, 3, 2, 9, 8, 19, 3, 22, 5, 7, 2, 2, 7, 4,…
## $ S009b     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S009c     <int> NA, NA, 4, NA, 2, NA, 1, NA, NA, 2, 3, NA, NA, NA, NA, NA, N…
## $ S009d     <int> 1, 2, 6, 1, 1, NA, 1, NA, NA, 5, 7, 2, 16, NA, 1, 1, 2, 3, N…
## $ S009e     <int> 2, 11, 6, 2, 3, 2, 1, 2, NA, 1, 7, 1, 4, 5, 5, 1, NA, 2, NA,…
## $ S009f     <int> NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, 2, NA, 2, NA, 1, NA, …
## $ S009g     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S009z     <int> NA, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, N…
## $ S010c     <int> NA, NA, 2, 2, 1, NA, NA, NA, NA, 2, 3, NA, 3, NA, NA, NA, NA…
## $ S010b     <int> NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, 5, NA, NA, NA…
## $ S010d     <int> 1, 7, 4, 2, 2, NA, 1, 2, NA, 3, 7, 2, 4, 2, 4, 1, 2, 3, NA, …
## $ S010e     <int> 2, 6, 9, 2, 3, 2, 2, NA, NA, 2, 9, 1, 15, 2, 3, 1, NA, 4, 2,…
## $ S010z     <int> NA, NA, 2, NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA…
## $ S014h1    <int> 1, NA, NA, NA, 4, NA, NA, NA, 1, NA, NA, NA, 1, 1, 7, 1, 1, …
## $ S014h2    <int> NA, 2, 3, NA, 3, NA, NA, 1, NA, 8, 1, 3, NA, NA, 1, NA, NA, …
## $ S014h3    <int> NA, NA, NA, NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S014h4    <int> NA, NA, NA, 2, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S014a     <int> 1, 1, 1, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, NA, 0, 1, 1, 1,…
## $ S014c     <int> NA, 12, 12, 10, 6, NA, NA, 6, NA, NA, NA, 7, NA, NA, NA, NA,…
## $ S014d     <int> NA, 2, 4, 10, 6, NA, NA, 2, NA, NA, NA, 7, NA, NA, NA, NA, N…
## $ S014e     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, …
## $ S014f     <int> NA, 75, 150, NA, 50, NA, NA, 50, NA, NA, NA, 15, NA, NA, NA,…
## $ S014g     <int> NA, 2008, 2007, 2018, NA, NA, NA, 2008, NA, NA, NA, 2012, NA…
## $ S013a     <int> 2, 2, 1, 1, 2, 2, 1, 2, 2, 2, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, …
## $ S013b     <int> 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, …
## $ S013c     <int> 3, 2, 1, 3, 3, 2, 4, 2, 2, 2, 4, 2, 2, 2, 2, 3, 3, 2, 2, 2, …
## $ S013d     <int> NA, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, NA, 0, 0…
## $ S013e     <int> NA, NA, NA, 1, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ SURID     <int> 316745, 296705, 316697, 316716, 316747, 296698, 316702, 3166…
```

```
summary(aser_school)
```

```
##      SYEAR          AREA         VMAPID          RNAME
## Min.   :2023   Min.   :2   Min.   : 30271   Length:6095
## 1st Qu.:2023   1st Qu.:2   1st Qu.:265637   Class :character
## Median :2023   Median :2   Median :284956   Mode  :character
## Mean   :2023   Mean   :2   Mean   :284882
## 3rd Qu.:2023   3rd Qu.:2   3rd Qu.:286091
## Max.   :2023   Max.   :2   Max.   :337126
##
##     DNAME              VlgId         VlgCode              SID
## Length:6095       Min.   :  146   Length:6095       Min.   :   1
## Class :character  1st Qu.: 5924   Class :character  1st Qu.:1524
## Mode  :character  Median : 7075   Mode  :character  Median :3050
##                   Mean   : 7444                     Mean   :3049
##                   3rd Qu.: 8310                     3rd Qu.:4574
##                   Max.   :22818                     Max.   :6097
##
##     STYPE            S006            S00             S00a
## Min.   :1.000   Min.   :1.000   Min.   :1.000   Length:6095
## 1st Qu.:1.000   1st Qu.:1.000   1st Qu.:1.000   Class :character
## Median :1.000   Median :1.000   Median :2.000   Mode  :character
## Mean   :1.275   Mean   :1.166   Mean   :2.051
## 3rd Qu.:2.000   3rd Qu.:1.000   3rd Qu.:3.000
## Max.   :2.000   Max.   :4.000   Max.   :4.000
##                 NA's   :5481
##     S001            S002           S002a            S002Y
## Min.   :1.000   Min.   :1.000   Length:6095       Min.   :1829
## 1st Qu.:1.000   1st Qu.:1.000   Class :character  1st Qu.:1982
## Median :1.000   Median :2.000   Mode  :character  Median :1999
## Mean   :1.625   Mean   :1.905                     Mean   :1993
## 3rd Qu.:2.000   3rd Qu.:2.000                     3rd Qu.:2011
## Max.   :3.000   Max.   :4.000                     Max.   :2023
##                 NA's   :210                       NA's   :895
##     S007E           S007P           S03a1            S03b1
## Min.   :  10.0  Min.   :   2.0  Min.   :0.0000   Length:6095
## 1st Qu.:  85.0  1st Qu.:  69.0  1st Qu.:0.0000   Class :character
## Median : 154.0  Median : 134.0  Median :0.0000   Mode  :character
## Mean   : 203.1  Mean   : 181.2  Mean   :0.4929
## 3rd Qu.: 250.0  3rd Qu.: 224.0  3rd Qu.:1.0000
## Max.   :2342.0  Max.   :2196.0  Max.   :1.0000
##                                 NA's   :283
##     S03f1           S03d1           S03e1            S03c1
## Min.   :0.0000  Min.   :0.0000  Min.   :0.0000   Min.   :1.000
## 1st Qu.:0.0000  1st Qu.:1.0000  1st Qu.:1.0000   1st Qu.:1.000
## Median :1.0000  Median :1.0000  Median :1.0000   Median :1.000
## Mean   :0.7127  Mean   :0.8779  Mean   :0.8147   Mean   :1.101
## 3rd Qu.:1.0000  3rd Qu.:1.0000  3rd Qu.:1.0000   3rd Qu.:1.000
## Max.   :1.0000  Max.   :1.0000  Max.   :1.0000   Max.   :3.000
## NA's   :358     NA's   :355     NA's   :310      NA's   :1944
##     S03a2           S03b2            S03f2            S03d2
## Min.   :0.0000  Length:6095       Min.   :0.0000   Min.   :0.0000
## 1st Qu.:0.0000  Class :character  1st Qu.:0.0000   1st Qu.:0.0000
## Median :0.0000  Mode  :character  Median :0.0000   Median :1.0000
```

```
##    Mean   :0.1795                       Mean   :0.4581   Mean   :0.5353
##    3rd Qu.:0.0000                        3rd Qu.:1.0000   3rd Qu.:1.0000
##    Max.   :1.0000                        Max.   :1.0000   Max.   :1.0000
##    NA's   :2618                          NA's   :2718     NA's   :2712
##      S03e2            S03c2             S004             S004VB1
##    Min.   :0.0000   Min.   :1.000    Min.   :0.0000   Min.   : 1.000
##    1st Qu.:0.0000   1st Qu.:1.000    1st Qu.:0.0000   1st Qu.: 1.000
##    Median :1.0000   Median :1.000    Median :0.0000   Median : 2.000
##    Mean   :0.5151   Mean   :1.053    Mean   :0.1055   Mean   : 2.336
##    3rd Qu.:1.0000   3rd Qu.:1.000    3rd Qu.:0.0000   3rd Qu.: 2.500
##    Max.   :1.0000   Max.   :3.000    Max.   :1.0000   Max.   :20.000
##    NA's   :2709     NA's   :3731     NA's   :465      NA's   :5824
##      S004VB2          S004VB3           S004VG1          S004VG2
##    Min.   :1.000    Min.   :1.000    Min.   : 1.000   Min.   :1.000
##    1st Qu.:1.000    1st Qu.:1.000    1st Qu.: 1.000   1st Qu.:1.000
##    Median :1.000    Median :1.000    Median : 1.000   Median :1.000
##    Mean   :1.862    Mean   :1.938    Mean   : 2.125   Mean   :1.906
##    3rd Qu.:2.000    3rd Qu.:2.000    3rd Qu.: 2.000   3rd Qu.:2.000
##    Max.   :8.000    Max.   :8.000    Max.   :25.000   Max.   :9.000
##    NA's   :6037     NA's   :6079     NA's   :5927     NA's   :6063
##      S004VG3          S004HB1           S004HB2          S004HB3
##    Min.   :1.000    Min.   : 1.000   Min.   :1.000    Min.   :1.000
##    1st Qu.:1.000    1st Qu.: 1.000   1st Qu.:1.000    1st Qu.:1.000
##    Median :1.000    Median : 1.000   Median :1.000    Median :1.000
##    Mean   :1.833    Mean   : 1.812   Mean   :1.429    Mean   :1.941
##    3rd Qu.:1.000    3rd Qu.: 2.000   3rd Qu.:1.000    3rd Qu.:1.000
##    Max.   :6.000    Max.   :13.000   Max.   :8.000    Max.   :8.000
##    NA's   :6089     NA's   :5887     NA's   :6053     NA's   :6078
##      S004HG1          S004HG2           S004HG3          S004PB1
##    Min.   :1.000    Min.   :1.000    Min.   :1.000    Min.   : 1.000
##    1st Qu.:1.000    1st Qu.:1.000    1st Qu.:1.000    1st Qu.: 1.000
##    Median :1.000    Median :1.000    Median :1.000    Median : 1.000
##    Mean   :1.444    Mean   :1.406    Mean   :1.364    Mean   : 1.668
##    3rd Qu.:2.000    3rd Qu.:2.000    3rd Qu.:1.000    3rd Qu.: 2.000
##    Max.   :7.000    Max.   :6.000    Max.   :5.000    Max.   :11.000
##    NA's   :5996     NA's   :6063     NA's   :6084     NA's   :5731
##      S004PB2          S004PB3           S004PG1          S004PG2          S004PG3
##    Min.   :1.000    Min.   :1.000    Min.   :1.000    Min.   :1.000    Min.   :1.0
##    1st Qu.:1.000    1st Qu.:1.000    1st Qu.:1.000    1st Qu.:1.000    1st Qu.:1.0
##    Median :1.000    Median :1.000    Median :1.000    Median :1.000    Median :1.0
##    Mean   :1.626    Mean   :1.714    Mean   :1.562    Mean   :1.404    Mean   :1.8
##    3rd Qu.:2.000    3rd Qu.:2.000    3rd Qu.:2.000    3rd Qu.:1.000    3rd Qu.:2.0
##    Max.   :8.000    Max.   :7.000    Max.   :9.000    Max.   :7.000    Max.   :6.0
##    NA's   :5980     NA's   :6060     NA's   :5951     NA's   :6043     NA's   :6080
##      S004IB1          S004IB2           S004IB3          S004IG1
##    Min.   : 1.00    Min.   : 1       Min.   : 1.000   Min.   : 1.000
##    1st Qu.: 1.00    1st Qu.: 1       1st Qu.: 1.000   1st Qu.: 1.000
##    Median : 1.00    Median : 1       Median : 1.000   Median : 1.000
##    Mean   : 2.75    Mean   : 2       Mean   : 2.692   Mean   : 2.186
##    3rd Qu.: 2.00    3rd Qu.: 1       3rd Qu.: 3.000   3rd Qu.: 2.000
##    Max.   :50.00    Max.   :30       Max.   :13.000   Max.   :15.000
##    NA's   :5967     NA's   :6031     NA's   :6082     NA's   :6025
```

```
##     S004IG2          S004IG3         S004SCRB1          S004SCRB2
## Min.   :1.000   Min.   :1.000   Min.   : 1.000   Min.   : 1.000
## 1st Qu.:1.000   1st Qu.:1.000   1st Qu.: 1.000   1st Qu.: 1.000
## Median :1.000   Median :1.000   Median : 1.000   Median : 2.000
## Mean   :1.714   Mean   :1.333   Mean   : 2.902   Mean   : 2.238
## 3rd Qu.:1.000   3rd Qu.:1.000   3rd Qu.: 2.250   3rd Qu.: 2.000
## Max.   :8.000   Max.   :3.000   Max.   :30.000   Max.   :12.000
## NA's   :6074    NA's   :6089    NA's   :6003     NA's   :6074
##    S004SCRB3        S004SCRG1         S004SCRG2         S004SCRG3
## Min.   :1       Min.   : 1.000   Min.   :1.000   Min.   :1
## 1st Qu.:1       1st Qu.: 1.000   1st Qu.:1.000   1st Qu.:1
## Median :2       Median : 1.000   Median :1.500   Median :1
## Mean   :2       Mean   : 2.622   Mean   :2.667   Mean   :2
## 3rd Qu.:2       3rd Qu.: 3.000   3rd Qu.:4.250   3rd Qu.:3
## Max.   :5       Max.   :33.000   Max.   :7.000   Max.   :5
## NA's   :6082    NA's   :6050    NA's   :6083     NA's   :6087
##    S004COTB1        S004COTB2         S004COTB3         S004COTG1
## Min.   : 1.000   Min.   : 1.000   Min.   : 1.000   Min.   : 1.000
## 1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.: 1.000
## Median : 2.000   Median : 1.000   Median : 1.000   Median : 1.000
## Mean   : 2.713   Mean   : 2.289   Mean   : 2.389   Mean   : 2.074
## 3rd Qu.: 3.000   3rd Qu.: 2.000   3rd Qu.: 1.750   3rd Qu.: 2.000
## Max.   :17.000   Max.   :17.000   Max.   :15.000   Max.   :16.000
## NA's   :5966    NA's   :6057    NA's   :6077     NA's   :6041
##    S004COTG2        S004COTG3         S004FR          S004FT          S004FHN
## Min.   :1.000   Min.   :1.000   Min.   :0.00   Min.   :0.000   Min.   :0.000
## 1st Qu.:1.000   1st Qu.:1.000   1st Qu.:0.00   1st Qu.:0.000   1st Qu.:0.000
## Median :2.000   Median :1.000   Median :0.00   Median :1.000   Median :0.000
## Mean   :3.444   Mean   :1.444   Mean   :0.28   Mean   :0.527   Mean   :0.112
## 3rd Qu.:5.000   3rd Qu.:1.000   3rd Qu.:1.00   3rd Qu.:1.000   3rd Qu.:0.000
## Max.   :9.000   Max.   :5.000   Max.   :1.00   Max.   :1.000   Max.   :1.000
## NA's   :6086    NA's   :6086    NA's   :3939   NA's   :3465    NA's   :3472
##    S004TSS          S004ADHI          S004TF           S011Ob1
## Min.   :0.000   Min.   :0.000   Min.   :0.000   Min.   :0.0000
## 1st Qu.:0.000   1st Qu.:0.000   1st Qu.:0.000   1st Qu.:1.0000
## Median :0.000   Median :0.000   Median :0.000   Median :1.0000
## Mean   :0.248   Mean   :0.052   Mean   :0.083   Mean   :0.7932
## 3rd Qu.:0.000   3rd Qu.:0.000   3rd Qu.:0.000   3rd Qu.:1.0000
## Max.   :1.000   Max.   :1.000   Max.   :1.000   Max.   :1.0000
## NA's   :3470    NA's   :3475    NA's   :3478    NA's   :209
##    S011Ob2          S011Ob3          S011Ob4          S011Ob5
## Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
## 1st Qu.:0.0000   1st Qu.:1.0000   1st Qu.:0.0000   1st Qu.:0.0000
## Median :1.0000   Median :1.0000   Median :0.0000   Median :0.0000
## Mean   :0.5744   Mean   :0.7763   Mean   :0.2729   Mean   :0.2247
## 3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.0000
## Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
## NA's   :219     NA's   :226     NA's   :239      NA's   :270
##    S011Ob6          S011Ob7          S011Ob8          S011Ob9
## Min.   : 1.000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
## 1st Qu.: 1.000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
## Median : 1.000   Median :1.0000   Median :1.0000   Median :0.0000
```

```
##    Mean    : 2.307   Mean    :0.7448   Mean    :0.5436   Mean    :0.2871
##    3rd Qu.: 1.000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000
##    Max.    :90.000   Max.    :1.0000   Max.    :1.0000   Max.    :1.0000
##    NA's    :4921    NA's    :265     NA's    :869     NA's    :432
##       S011Ob10          S011Ob11          S011Ob12          S011Ob13
##    Min.    :0.000   Min.    :1.000   Min.    :0.0000   Min.    :0.0000
##    1st Qu.:0.000   1st Qu.:1.000   1st Qu.:0.0000   1st Qu.:0.0000
##    Median :0.000   Median :1.000   Median :1.0000   Median :0.0000
##    Mean    :0.453   Mean    :1.076   Mean    :0.7448   Mean    :0.4564
##    3rd Qu.:1.000   3rd Qu.:1.000   3rd Qu.:1.0000   3rd Qu.:1.0000
##    Max.    :1.000   Max.    :2.000   Max.    :1.0000   Max.    :1.0000
##    NA's    :4561    NA's    :4418    NA's    :280     NA's    :306
##       S011Ob14          S011Ob15          S011Ob16          S011Ob17
##    Min.    :0.0000   Min.    :0.0000   Min.    :0.0000   Min.    :0.0000
##    1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##    Median :1.0000   Median :0.0000   Median :1.0000   Median :1.0000
##    Mean    :0.6607   Mean    :0.4558   Mean    :0.6741   Mean    :0.7325
##    3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000
##    Max.    :1.0000   Max.    :1.0000   Max.    :1.0000   Max.    :1.0000
##    NA's    :1642    NA's    :1639    NA's    :298     NA's    :267
##       S011Ob18          S011Ob19          S011Ob20          S012Ob1
##    Min.    :0.0000   Min.    :0.0000   Min.    :0.0000   Min.    :  1.000
##    1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:  4.000
##    Median :0.0000   Median :0.0000   Median :0.0000   Median :  6.000
##    Mean    :0.1739   Mean    :0.3194   Mean    :0.1439   Mean    :  8.074
##    3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.: 11.000
##    Max.    :1.0000   Max.    :1.0000   Max.    :1.0000   Max.    :158.000
##    NA's    :297     NA's    :271     NA's    :361     NA's    :302
##       S012Ob2           S012Ob3           S012Ob4           S012Ob5
##    Min.    :  1.000   Min.    :120   Min.    :  0.000   Min.    :  0.000
##    1st Qu.:  3.000   1st Qu.:224   1st Qu.:  1.000   1st Qu.:  1.000
##    Median :  5.000   Median :260   Median :  1.000   Median :  1.000
##    Mean    :  6.663   Mean    :244   Mean    :  1.777   Mean    :  1.514
##    3rd Qu.:  9.000   3rd Qu.:260   3rd Qu.:  2.000   3rd Qu.:  2.000
##    Max.    :156.000   Max.    :300   Max.    : 23.000   Max.    : 16.000
##    NA's    :349     NA's    :565    NA's    :4074    NA's    :3834
##       S012Ob6           S012Ob7           S012Ob8           S012Ob11
##    Min.    :  0.000   Min.    :  0.000   Min.    :  0.000   Min.    :  0.000
##    1st Qu.:  1.000   1st Qu.:  1.000   1st Qu.:  1.000   1st Qu.:  1.000
##    Median :  1.000   Median :  1.000   Median :  1.000   Median :  1.000
##    Mean    :  1.778   Mean    :  1.697   Mean    :  2.522   Mean    :  1.558
##    3rd Qu.:  2.000   3rd Qu.:  2.000   3rd Qu.:  3.000   3rd Qu.:  2.000
##    Max.    : 22.000   Max.    : 21.000   Max.    : 50.000   Max.    : 20.000
##    NA's    :2982    NA's    :3444    NA's    :3399    NA's    :4488
##       S012Ob12          S012Ob13          S012Ob14          S012Ob15
##    Min.    :0.0000   Min.    :0.0000   Min.    :0.000   Min.    :0.000
##    1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.000   1st Qu.:1.000
##    Median :0.0000   Median :0.0000   Median :1.000   Median :1.000
##    Mean    :0.1622   Mean    :0.1832   Mean    :0.613   Mean    :0.857
##    3rd Qu.:0.0000   3rd Qu.:0.0000   3rd Qu.:1.000   3rd Qu.:1.000
##    Max.    :1.0000   Max.    :1.0000   Max.    :1.000   Max.    :1.000
##    NA's    :652     NA's    :785     NA's    :5200    NA's    :5186
```

```
##     S012Ob16          S008TA              S008TP            S009b
## Min.   :0.000   Min.   :  1.000   Min.   :  0.00   Min.   : 0.000
## 1st Qu.:0.000   1st Qu.:  4.000   1st Qu.:  2.00   1st Qu.: 1.000
## Median :0.000   Median :  7.000   Median :  5.00   Median : 2.000
## Mean   :0.293   Mean   :  9.565   Mean   :  7.36   Mean   : 2.043
## 3rd Qu.:1.000   3rd Qu.: 13.000   3rd Qu.: 10.00   3rd Qu.: 2.000
## Max.   :1.000   Max.   :135.000   Max.   :134.00   Max.   :12.000
## NA's   :5259    NA's   :198       NA's   :198      NA's   :5240
##      S009c             S009d             S009e            S009f
## Min.   : 0.00    Min.   : 0.000   Min.   : 0.000   Min.   : 0.000
## 1st Qu.: 1.00    1st Qu.: 1.000   1st Qu.: 2.000   1st Qu.: 1.000
## Median : 2.00    Median : 3.000   Median : 3.000   Median : 1.000
## Mean   : 2.37    Mean   : 3.475   Mean   : 4.702   Mean   : 1.928
## 3rd Qu.: 3.00    3rd Qu.: 4.000   3rd Qu.: 6.000   3rd Qu.: 2.000
## Max.   :21.00    Max.   :35.000   Max.   :44.000   Max.   :23.000
## NA's   :3856     NA's   :1787     NA's   :1581     NA's   :4964
##      S009g             S009z             S010c            S010b
## Min.   :1        Min.   : 0.000   Min.   : 0.000   Min.   : 0.000
## 1st Qu.:1        1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.: 1.000
## Median :1        Median : 1.000   Median : 2.000   Median : 2.000
## Mean   :1        Mean   : 1.933   Mean   : 2.366   Mean   : 2.509
## 3rd Qu.:1        3rd Qu.: 2.000   3rd Qu.: 3.000   3rd Qu.: 3.000
## Max.   :1        Max.   :10.000   Max.   :42.000   Max.   :30.000
## NA's   :6089     NA's   :5960     NA's   :4246     NA's   :3964
##      S010d             S010e             S010z            S014h1
## Min.   : 0.000   Min.   : 0.000   Min.   : 0.00    Min.   : 0.0
## 1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.: 0.00    1st Qu.: 1.0
## Median : 2.000   Median : 2.000   Median : 0.00    Median : 1.0
## Mean   : 3.832   Mean   : 3.178   Mean   : 1.15    Mean   : 3.2
## 3rd Qu.: 5.000   3rd Qu.: 4.000   3rd Qu.: 1.00    3rd Qu.: 4.0
## Max.   :56.000   Max.   :34.000   Max.   :30.00    Max.   :46.0
## NA's   :1581     NA's   :2663     NA's   :5059     NA's   :3971
##      S014h2            S014h3            S014h4            S014a
## Min.   : 0.000   Min.   : 0.000   Min.   : 0.000   Min.   :0.0000
## 1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.:0.0000
## Median : 2.000   Median : 2.000   Median : 2.000   Median :1.0000
## Mean   : 3.159   Mean   : 3.474   Mean   : 4.767   Mean   :0.6079
## 3rd Qu.: 3.000   3rd Qu.: 3.000   3rd Qu.: 4.000   3rd Qu.:1.0000
## Max.   :31.000   Max.   :38.000   Max.   :90.000   Max.   :1.0000
## NA's   :4218     NA's   :4763     NA's   :5334     NA's   :2211
##      S014c             S014d             S014e            S014f
## Min.   : 1.000   Min.   : 1.000   Min.   :   1059   Min.   :  1.0
## 1st Qu.: 6.000   1st Qu.: 5.000   1st Qu.:  16000   1st Qu.:  5.0
## Median : 8.000   Median : 7.000   Median :  38000   Median :  8.0
## Mean   : 8.053   Mean   : 6.746   Mean   :  71891   Mean   : 15.2
## 3rd Qu.: 9.000   3rd Qu.: 8.000   3rd Qu.:  68000   3rd Qu.: 15.0
## Max.   :80.000   Max.   :80.000   Max.   :1078692   Max.   :300.0
## NA's   :3377     NA's   :3377     NA's   :4530      NA's   :3872
##      S014g             S013a             S013b            S013c
## Min.   :1900    Min.   :1.000   Min.   :0.0000   Min.   :0.000
## 1st Qu.:1997    1st Qu.:1.000   1st Qu.:0.0000   1st Qu.:2.000
## Median :2011    Median :1.000   Median :1.0000   Median :2.000
```

```
##  Mean    :2004   Mean    :2.213   Mean    :0.6132   Mean    :2.453
##  3rd Qu.:2019   3rd Qu.:3.000   3rd Qu.:1.0000   3rd Qu.:3.000
##  Max.    :2023   Max.    :5.000   Max.    :1.0000   Max.    :5.000
##  NA's    :3723   NA's    :141    NA's    :837     NA's    :963
##      S013d           S013e             SURID
##  Min.    :0.000   Min.    : 1.00   Min.    : 10054
##  1st Qu.:0.000   1st Qu.: 7.00   1st Qu.:191705
##  Median :0.000   Median : 20.00   Median :264669
##  Mean    :0.228   Mean    : 22.91   Mean    :197659
##  3rd Qu.:0.000   3rd Qu.: 30.00   3rd Qu.:265781
##  Max.    :1.000   Max.    :132.00   Max.    :317067
##  NA's    :982     NA's    :4929
```

```r
child_house <- left_join(aser_child, aser_household, by = c("HHID")) # Merging the Child
and Household Datasets by HHID which stands for the unique Household ID

child_house_school <- left_join(child_house, aser_school, by = c("VMAPID")) # Merging th
e Child-Household Dataset that was created above with the School Dataset by VMAPID which
stands for the unique Village Map Survey ID
```

```
## Warning in left_join(child_house, aser_school, by = c("VMAPID")): Detected an unexpec
ted many-to-many relationship between `x` and `y`.
## ℹ Row 1 of `x` matches multiple rows in `y`.
## ℹ Row 3052 of `y` matches multiple rows in `x`.
## ℹ If a many-to-many relationship is expected, set `relationship =
##   "many-to-many"` to silence this warning.
```

```r
glimpse(child_house_school)
```

```
## Rows: 290,459
## Columns: 240
## $ Id                    <int> 1532002, 1532002, 1532003, 1532003, 1…
## $ RNAME.x               <chr> "PUNJAB", "PUNJAB", "PUNJAB", "PUNJAB…
## $ PrvCode               <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ DNAME.x               <chr> "VEHARI", "VEHARI", "VEHARI", "VEHARI…
## $ DstCode               <int> 35, 35, 35, 35, 35, 35, 35, 35, 35, 3…
## $ VCODES                <int> 6578, 6578, 6578, 6578, 6578, 6578, 6…
## $ C03                   <int> 11, 11, 7, 7, 4, 4, 4, 4, 12, 12, 8, …
## $ C04                   <int> 1, 1, 1, 1, NA, NA, 1, 1, 0, 0, 0, 0,…
## $ C05                   <int> 3, 3, 3, 3, NA, NA, NA, NA, 3, 3, 3, …
## $ C06                   <chr> "7", "7", "2", "2", "", "", "", "", "…
## $ C08                   <chr> "NULL", "NULL", "NULL", "NULL", "NULL…
## $ C09                   <chr> "NULL", "NULL", "NULL", "NULL", "NULL…
## $ C10                   <chr> "7", "7", "3", "3", "ECE", "ECE", "EC…
## $ C11                   <int> 1, 1, 2, 2, NA, NA, NA, NA, 2, 2, 2, …
## $ C12                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ C07                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ C13                   <int> 1, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 1, 1…
## $ C14                   <chr> "500", "500", "300", "300", "NULL", "…
## $ C15                   <int> 3, 3, 2, 2, NA, NA, NA, NA, 4, 4, 3, …
## $ C16                   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ B17                   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ C18                   <int> 1, 1, 1, 1, NA, NA, NA, NA, 1, 1, 1, …
## $ C19                   <int> 7, 7, 5, 5, NA, NA, NA, NA, 6, 6, 5, …
## $ C23                   <int> 1, 1, 1, 1, NA, NA, NA, NA, 1, 1, 1, …
## $ C24                   <int> 0, 0, 0, 0, NA, NA, NA, NA, 0, 0, 1, …
## $ C25                   <int> 0, 0, 0, 0, NA, NA, NA, NA, 0, 0, 0, …
## $ C20                   <int> 4, 4, 3, 3, NA, NA, NA, NA, 5, 5, 4, …
## $ C21                   <int> 1, 1, NA, NA, NA, NA, NA, NA, 1, 1, 1…
## $ C22                   <int> NA, NA, NA, NA, NA, NA, NA, NA, 1, 1,…
## $ C26a                  <int> 0, 0, NA, NA, NA, NA, NA, NA, 0, 0, 0…
## $ C26b                  <int> 1, 1, NA, NA, NA, NA, NA, NA, 0, 0, 0…
## $ C27                   <int> 1, 1, NA, NA, NA, NA, NA, NA, 1, 1, 1…
## $ PRID                  <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ ICH01                 <int> 2, 2, 1, 1, 2, 2, 1, 1, 1, 1, 2, 2, 1…
## $ ICH02                 <chr> "Other", "Other", "Allergies", "Aller…
## $ ICH03                 <int> 1, 1, 1, 1, 2, 2, 1, 1, 1, 1, 1, 1, 1…
## $ ICH05                 <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ BasicVaccines         <chr> "All vaccines", "All vaccines", "All …
## $ Allergies             <chr> "NULL", "NULL", "NULL", "NULL", "NULL…
## $ C28                   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ Polio                 <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ DPT_HepB_Hib          <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Pneumococcal          <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Measles               <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ BCG                   <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ AREA.x                <chr> "rural", "rural", "rural", "rural", "…
## $ HHID                  <int> 1365063, 1365063, 1365063, 1365063, 1…
## $ VMAPID                <int> 264391, 264391, 264391, 264391, 26439…
## $ HouseholdCounter      <int> 1, 1, 1, 1, 1, 1, 2, 2, 3, 3, 3, 3, 4…
## $ IsFamilyHead          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
```

```
## $ Gender                            <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ MaleMembers                       <int> 2, 2, 2, 2, 2, 2, 1, 1, 3, 3, 3, 3, 2…
## $ FemaleMembers                     <int> 3, 3, 3, 3, 3, 3, 2, 2, 1, 1, 1, 1, 2…
## $ EarningMembers                    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ EarningMembersChild               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ HouseType                         <int> 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3…
## $ IsHouseOwned                      <int> 1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 1…
## $ IsElectricityConnectionAvailable  <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ IsTVAvailable                     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRadioAvailable                  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsMobileAvailable                 <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ IsSmartPhoneAvailable             <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ Car                               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ MotorCycle                        <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ IsInternetAvailable               <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsComputerAvailable               <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsSolarPanelAvailable             <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ UseSms                            <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ UseWhatsApp                       <int> 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0…
## $ IsRecipientBISP                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientPSPA                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientAkhuwat                <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientEhsaas                 <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsRecipientOther                  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ TotalFuctionalToilets             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ IsTap                             <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsBore                            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsFilter                          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsToba                            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsChashma                         <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsOther                           <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ IsToiletAvailable                 <chr> "1", "1", "1", "1", "1", "1", "1", "1…
## $ CarOther                          <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ UsedComputer                      <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ UsedSmartPhone                    <int> 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2…
## $ ReadNewsPaper                     <int> 2, 2, 2, 2, 2, 2, 1, 1, 2, 2, 2, 2, 1…
## $ LearningPlatforms                 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ FloodsAffected                    <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ MigrantIDP                        <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ ClimateChange                     <int> 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2…
## $ FloodImpacted                     <int> 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3…
## $ EarningImpacted                   <int> 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4…
## $ PsychologicalImpacted             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ TravelMode                        <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ TravelTime                        <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ NadraRegistration                 <int> 3, 3, 3, 3, 3, 3, 1, 1, 2, 2, 2, 2, 2…
## $ FormBRegistration                 <int> 3, 3, 3, 3, 3, 3, 1, 1, 2, 2, 2, 2, 2…
## $ ChangeSchool                      <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ ChangeSchoolReason                <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ EducationExpense                  <int> 600, 600, 600, 600, 600, 600, NA, NA,…
## $ SchoolingAffected                 <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ MotherLanguage                    <chr> "Sindhi", "Sindhi", "Sindhi", "Sindhi…
```

```
## $ Religion              <chr> "Islam", "Islam", "Islam", "Islam", "…
## $ FunctionalToilet      <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ SYEAR                 <int> 2023, 2023, 2023, 2023, 2023, 2023, 2…
## $ AREA.y                <int> 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2…
## $ RNAME.y               <chr> "PUNJAB                              …
## $ DNAME.y               <chr> "VEHARI", "VEHARI", "VEHARI", "VEHARI…
## $ VlgId                 <int> 6578, 6578, 6578, 6578, 6578, 6578, 6…
## $ VlgCode               <chr> "1653", "1653", "1653", "1653", "1653…
## $ SID                   <int> 3054, 5555, 3054, 5555, 3054, 5555, 3…
## $ STYPE                 <int> 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1…
## $ S006                  <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S00                   <int> 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3…
## $ S00a                  <chr> "NULL", "", "NULL", "", "NULL", "", "…
## $ S001                  <int> 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2…
## $ S002                  <int> 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2…
## $ S002a                 <chr> "", "", "", "", "", "", "", "", "", "…
## $ S002Y                 <int> 1965, 2012, 1965, 2012, 1965, 2012, 1…
## $ S007E                 <int> 1058, 336, 1058, 336, 1058, 336, 1058…
## $ S007P                 <int> 990, 336, 990, 336, 990, 336, 990, 33…
## $ S03a1                 <int> 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0…
## $ S03b1                 <chr> "", "", "", "", "", "", "", "", "", "…
## $ S03f1                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03d1                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03e1                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03c1                 <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S03a2                 <int> 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0…
## $ S03b2                 <chr> "1", "", "1", "", "1", "", "1", "", "…
## $ S03f2                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03d2                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03e2                 <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S03c2                 <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S004                  <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S004VB1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004VB2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004VB3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004VG1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004VG2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004VG3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HB1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HB2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HB3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HG1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HG2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004HG3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PB1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PB2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PB3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PG1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PG2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004PG3               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004IB1               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004IB2               <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
```

```
## $ S004IB3     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004IG1     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004IG2     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004IG3     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRB1   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRB2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRB3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRG1   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRG2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004SCRG3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTB1   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTB2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTB3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTG1   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTG2   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004COTG3   <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S004FR      <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S004FT      <int> 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0…
## $ S004FHN     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S004TSS     <int> 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0…
## $ S004ADHI    <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S004TF      <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S011Ob1     <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob2     <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob3     <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob4     <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S011Ob5     <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S011Ob6     <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S011Ob7     <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob8     <int> 1, NA, 1, NA, 1, NA, 1, NA, 1, NA, 1,…
## $ S011Ob9     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S011Ob10    <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S011Ob11    <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S011Ob12    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob13    <int> 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0…
## $ S011Ob14    <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S011Ob15    <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S011Ob16    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob17    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S011Ob18    <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S011Ob19    <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S011Ob20    <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S012Ob1     <int> 14, 20, 14, 20, 14, 20, 14, 20, 14, 2…
## $ S012Ob2     <int> 11, 16, 11, 16, 11, 16, 11, 16, 11, 1…
## $ S012Ob3     <int> 224, 270, 224, 270, 224, 270, 224, 27…
## $ S012Ob4     <int> 1, NA, 1, NA, 1, NA, 1, NA, 1, NA, 1,…
## $ S012Ob5     <int> 1, NA, 1, NA, 1, NA, 1, NA, 1, NA, 1,…
## $ S012Ob6     <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S012Ob7     <int> 8, 1, 8, 1, 8, 1, 8, 1, 8, 1, 8, 1, 8…
## $ S012Ob8     <int> 50, NA, 50, NA, 50, NA, 50, NA, 50, N…
## $ S012Ob11    <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S012Ob12    <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
```

```
## $ S012Ob13          <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S012Ob14          <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S012Ob15          <int> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1…
## $ S012Ob16          <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S008TA            <int> 29, 26, 29, 26, 29, 26, 29, 26, 29, 2…
## $ S008TP            <int> 25, 25, 25, 25, 25, 25, 25, 25, 25, 2…
## $ S009b             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S009c             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S009d             <int> 4, 5, 4, 5, 4, 5, 4, 5, 4, 5, 4, 5, 4…
## $ S009e             <int> 16, 19, 16, 19, 16, 19, 16, 19, 16, 1…
## $ S009f             <int> 4, 2, 4, 2, 4, 2, 4, 2, 4, 2, 4, 2, 4…
## $ S009g             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S009z             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S010c             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S010b             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ S010d             <int> 18, 8, 18, 8, 18, 8, 18, 8, 18, 8, 18…
## $ S010e             <int> 6, 2, 6, 2, 6, 2, 6, 2, 6, 2, 6, 2, 6…
## $ S010z             <int> NA, 0, NA, 0, NA, 0, NA, 0, NA, 0, NA…
## $ S014h1            <int> NA, 1, NA, 1, NA, 1, NA, 1, NA, 1, NA…
## $ S014h2            <int> 12, NA, 12, NA, 12, NA, 12, NA, 12, N…
## $ S014h3            <int> 2, NA, 2, NA, 2, NA, 2, NA, 2, NA, 2,…
## $ S014h4            <int> NA, 20, NA, 20, NA, 20, NA, 20, NA, 2…
## $ S014a             <int> 1, NA, 1, NA, 1, NA, 1, NA, 1, NA, 1,…
## $ S014c             <int> 17, NA, 17, NA, 17, NA, 17, NA, 17, N…
## $ S014d             <int> 10, NA, 10, NA, 10, NA, 10, NA, 10, N…
## $ S014e             <int> 185000, NA, 185000, NA, 185000, NA, 1…
## $ S014f             <int> 9, NA, 9, NA, 9, NA, 9, NA, 9, NA, 9,…
## $ S014g             <int> 1980, NA, 1980, NA, 1980, NA, 1980, N…
## $ S013a             <int> 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2…
## $ S013b             <int> 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1…
## $ S013c             <int> 1, 3, 1, 3, 1, 3, 1, 3, 1, 3, 1, 3, 1…
## $ S013d             <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0…
## $ S013e             <int> NA, NA, NA, NA, NA, NA, NA, NA, NA, N…
## $ SURID             <int> 10094, 264391, 10094, 264391, 10094, …
```

```
summary(child_house_school)
```

```
##       Id             RNAME.x            PrvCode           DNAME.x
## Min.   :1532002   Length:290459     Min.   :1.000     Length:290459
## 1st Qu.:1617121   Class :character   1st Qu.:2.000     Class :character
## Median :2599351   Mode  :character   Median :3.000     Mode  :character
## Mean   :2368619                      Mean   :3.073
## 3rd Qu.:2655893                      3rd Qu.:4.000
## Max.   :2764055                      Max.   :7.000
##
##     DstCode           VCODES            C03               C04
## Min.   :  1.00    Min.   :    1     Min.   : 3.000    Min.   :0.0000
## 1st Qu.: 39.00    1st Qu.: 1200     1st Qu.: 6.000    1st Qu.:0.0000
## Median : 80.00    Median : 2873     Median : 9.000    Median :0.0000
## Mean   : 79.98    Mean   : 3727     Mean   : 9.062    Mean   :0.4695
## 3rd Qu.:118.00    3rd Qu.: 5559     3rd Qu.:12.000    3rd Qu.:1.0000
## Max.   :179.00    Max.   :22818     Max.   :16.000    Max.   :2.0000
##                                     NA's   :943       NA's   :1958
##      C05              C06               C08               C09
## Min.   :1.000    Length:290459     Length:290459     Length:290459
## 1st Qu.:3.000    Class :character  Class :character  Class :character
## Median :3.000    Mode  :character  Mode  :character  Mode  :character
## Mean   :2.638
## 3rd Qu.:3.000
## Max.   :3.000
## NA's   :2088
##     C10               C11               C12               C07
## Length:290459     Min.   :1.0       Min.   :0.00      Min.   :0.00
## Class :character  1st Qu.:1.0       1st Qu.:0.00      1st Qu.:0.00
## Mode  :character  Median :1.0       Median :0.00      Median :0.00
##                   Mean   :1.3       Mean   :0.42      Mean   :0.06
##                   3rd Qu.:2.0       3rd Qu.:1.00      3rd Qu.:0.00
##                   Max.   :4.0       Max.   :1.00      Max.   :1.00
##                   NA's   :59255     NA's   :54015     NA's   :55772
##     C13              C14               C15               C16
## Min.   :0.00     Length:290459     Min.   :1.00      Min.   :0.00
## 1st Qu.:0.00     Class :character  1st Qu.:2.00      1st Qu.:1.00
## Median :0.00     Mode  :character  Median :3.00      Median :1.00
## Mean   :0.11                       Mean   :3.36      Mean   :0.93
## 3rd Qu.:0.00                       3rd Qu.:5.00      3rd Qu.:1.00
## Max.   :1.00                       Max.   :5.00      Max.   :1.00
## NA's   :57375                      NA's   :79323     NA's   :218801
##     B17              C18               C19               C23
## Min.   :0.00     Min.   :1.00      Min.   :1.00      Min.   :0.00
## 1st Qu.:1.00     1st Qu.:1.00      1st Qu.:2.00      1st Qu.:0.00
## Median :1.00     Median :1.00      Median :4.00      Median :1.00
## Mean   :0.92     Mean   :1.08      Mean   :4.36      Mean   :0.53
## 3rd Qu.:1.00     3rd Qu.:1.00      3rd Qu.:7.00      3rd Qu.:1.00
## Max.   :1.00     Max.   :2.00      Max.   :7.00      Max.   :1.00
## NA's   :218768   NA's   :79655     NA's   :78112     NA's   :86175
##     C24              C25               C20               C21
## Min.   :0.00     Min.   :0.00      Min.   :1.00      Min.   :0.00
## 1st Qu.:0.00     1st Qu.:0.00      1st Qu.:2.00      1st Qu.:0.00
## Median :0.00     Median :0.00      Median :4.00      Median :1.00
```

```
##    Mean   :0.43    Mean   :0.42    Mean   :3.39    Mean   :0.56
##    3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:5.00    3rd Qu.:1.00
##    Max.   :1.00    Max.   :1.00    Max.   :5.00    Max.   :1.00
##    NA's   :87143   NA's   :87459   NA's   :79401   NA's   :143605
##       C22             C26a            C26b             C27
##    Min.   :0.00    Min.   :0.00    Min.   :0.00    Min.   :0.00
##    1st Qu.:0.00    1st Qu.:0.00    1st Qu.:0.00    1st Qu.:0.00
##    Median :1.00    Median :1.00    Median :1.00    Median :1.00
##    Mean   :0.55    Mean   :0.55    Mean   :0.53    Mean   :0.56
##    3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:1.00
##    Max.   :1.00    Max.   :1.00    Max.   :1.00    Max.   :1.00
##    NA's   :173653  NA's   :140580  NA's   :141368  NA's   :142001
##       PRID            ICH01           ICH02            ICH03
##    Min.   : 1.00   Min.   :1.000   Length:290459   Min.   :1.00
##    1st Qu.: 1.00   1st Qu.:1.000   Class :character 1st Qu.:1.00
##    Median : 1.00   Median :2.000   Mode  :character Median :2.00
##    Mean   : 1.01   Mean   :1.963                    Mean   :2.38
##    3rd Qu.: 1.00   3rd Qu.:3.000                    3rd Qu.:4.00
##    Max.   :20.00   Max.   :5.000                    Max.   :4.00
##    NA's   :217291  NA's   :21296                    NA's   :46679
##       ICH05        BasicVaccines      Allergies          C28
##    Min.   :0.000  Length:290459    Length:290459   Min.   :0.00
##    1st Qu.:0.000  Class :character Class :character 1st Qu.:0.00
##    Median :0.000  Mode  :character Mode  :character Median :0.00
##    Mean   :0.178                                   Mean   :0.14
##    3rd Qu.:0.000                                   3rd Qu.:0.00
##    Max.   :1.000                                   Max.   :1.00
##    NA's   :27152                                   NA's   :93199
##       Polio        DPT_HepB_Hib    Pneumococcal     Measles
##    Min.   :1      Min.   :1       Min.   :1       Min.   :1
##    1st Qu.:1      1st Qu.:1       1st Qu.:1       1st Qu.:1
##    Median :1      Median :1       Median :1       Median :1
##    Mean   :1      Mean   :1       Mean   :1       Mean   :1
##    3rd Qu.:1      3rd Qu.:1       3rd Qu.:1       3rd Qu.:1
##    Max.   :1      Max.   :1       Max.   :1       Max.   :1
##    NA's   :90667  NA's   :139327  NA's   :136417  NA's   :133168
##       BCG            AREA.x            HHID            VMAPID
##    Min.   :1      Length:290459    Min.   :1365063  Min.   : 30271
##    1st Qu.:1      Class :character 1st Qu.:1422395  1st Qu.:266161
##    Median :1      Mode  :character Median :2402526  Median :285201
##    Mean   :1                       Mean   :2162013  Mean   :286430
##    3rd Qu.:1                       3rd Qu.:2422679  3rd Qu.:286216
##    Max.   :1                       Max.   :2500560  Max.   :337126
##    NA's   :128398
## HouseholdCounter    IsFamilyHead       Gender        MaleMembers
##    Min.   :       0 Min.   :0.00    Min.   :1.0     Min.   : 0.00
##    1st Qu.:       5 1st Qu.:0.00    1st Qu.:1.0     1st Qu.: 2.00
##    Median :      10 Median :1.00    Median :1.0     Median : 3.00
##    Mean   :     176 Mean   :0.71    Mean   :1.2     Mean   : 3.19
##    3rd Qu.:      15 3rd Qu.:1.00    3rd Qu.:1.0     3rd Qu.: 4.00
##    Max.   :14725896 Max.   :1.00    Max.   :3.0     Max.   :15.00
##    NA's   :124      NA's   :217291  NA's   :217823  NA's   :21363
```

```
##   FemaleMembers    EarningMembers    EarningMembersChild   HouseType
## Min.   : 0.000   Min.   :0.0e+00   Min.   : 0.00      Min.   :1.000
## 1st Qu.: 2.000   1st Qu.:1.0e+00   1st Qu.: 0.00      1st Qu.:1.000
## Median : 3.000   Median :1.0e+00   Median : 0.00      Median :2.000
## Mean   : 2.871   Mean   :8.2e+00   Mean   : 0.28      Mean   :1.971
## 3rd Qu.: 4.000   3rd Qu.:1.0e+00   3rd Qu.: 0.00      3rd Qu.:3.000
## Max.   :46.000   Max.   :5.0e+05   Max.   :53.00      Max.   :3.000
## NA's   :21570    NA's   :24386     NA's   :127102     NA's   :927
##   IsHouseOwned   IsElectricityConnectionAvailable IsTVavailable
## Min.   :0.000   Min.   :0.000                     Min.   :0.0
## 1st Qu.:1.000   1st Qu.:1.000                     1st Qu.:0.0
## Median :1.000   Median :1.000                     Median :0.0
## Mean   :0.886   Mean   :0.871                     Mean   :0.4
## 3rd Qu.:1.000   3rd Qu.:1.000                     3rd Qu.:1.0
## Max.   :1.000   Max.   :1.000                     Max.   :1.0
## NA's   :20549   NA's   :19807                     NA's   :21402
##   IsRadioAvailable IsMobileAvailable IsSmartPhoneAvailable      Car
## Min.   :0.000    Min.   :0.000    Min.   :0.000       Min.   :0.00
## 1st Qu.:0.000    1st Qu.:1.000    1st Qu.:0.000       1st Qu.:0.00
## Median :0.000    Median :1.000    Median :1.000       Median :0.00
## Mean   :0.122    Mean   :0.864    Mean   :0.648       Mean   :0.17
## 3rd Qu.:0.000    3rd Qu.:1.000    3rd Qu.:1.000       3rd Qu.:0.00
## Max.   :1.000    Max.   :1.000    Max.   :1.000       Max.   :9.00
## NA's   :25950    NA's   :19630    NA's   :23158       NA's   :154315
##   MotorCycle    IsInternetAvailable IsComputerAvailable IsSolarPanelAvailable
## Min.   :0.00    Min.   :0.000       Min.   :0.000      Min.   :0.000
## 1st Qu.:0.00    1st Qu.:0.000       1st Qu.:0.000      1st Qu.:0.000
## Median :1.00    Median :0.000       Median :0.000      Median :0.000
## Mean   :0.75    Mean   :0.244       Mean   :0.139      Mean   :0.349
## 3rd Qu.:1.00    3rd Qu.:0.000       3rd Qu.:0.000      3rd Qu.:1.000
## Max.   :6.00    Max.   :1.000       Max.   :1.000      Max.   :1.000
## NA's   :81517   NA's   :25224       NA's   :25803      NA's   :24090
##     UseSms      UseWhatsApp    IsRecipientBISP  IsRecipientPSPA
## Min.   :0.000   Min.   :0.000   Min.   :0.00    Min.   :0
## 1st Qu.:0.000   1st Qu.:0.000   1st Qu.:0.00    1st Qu.:0
## Median :1.000   Median :1.000   Median :0.00    Median :0
## Mean   :0.731   Mean   :0.635   Mean   :0.29    Mean   :0
## 3rd Qu.:1.000   3rd Qu.:1.000   3rd Qu.:1.00    3rd Qu.:0
## Max.   :1.000   Max.   :1.000   Max.   :1.00    Max.   :1
## NA's   :20098   NA's   :22939   NA's   :217291  NA's   :217291
##   IsRecipientAkhuwat IsRecipientEhsaas IsRecipientOther TotalFuctionalToilets
## Min.   :0.00        Min.   :0         Min.   :0.00     Min.   :1
## 1st Qu.:0.00        1st Qu.:0         1st Qu.:0.00     1st Qu.:1
## Median :0.00        Median :0         Median :0.00     Median :1
## Mean   :0.02        Mean   :0         Mean   :0.08     Mean   :1
## 3rd Qu.:0.00        3rd Qu.:0         3rd Qu.:0.00     3rd Qu.:1
## Max.   :1.00        Max.   :1         Max.   :1.00     Max.   :1
## NA's   :217291      NA's   :217291    NA's   :217291   NA's   :290456
##     IsTap          IsBore          IsFilter         IsToba
## Min.   :0        Min.   :0        Min.   :0        Min.   :0
## 1st Qu.:0        1st Qu.:0        1st Qu.:0        1st Qu.:0
## Median :0        Median :0        Median :0        Median :0
```

```
##  Mean    :0         Mean    :0         Mean    :0         Mean    :0
##  3rd Qu.:0         3rd Qu.:0         3rd Qu.:0         3rd Qu.:0
##  Max.    :1         Max.    :1         Max.    :1         Max.    :0
##  NA's    :217291   NA's    :217291   NA's    :217291   NA's    :217291
##    IsChashma          IsOther         IsToiletAvailable   CarOther
##  Min.    :0         Min.    :0         Length:290459      Min.    :0.00
##  1st Qu.:0         1st Qu.:0         Class :character   1st Qu.:0.00
##  Median :0         Median :0         Mode  :character   Median :0.00
##  Mean    :0         Mean    :0                            Mean    :0.16
##  3rd Qu.:0         3rd Qu.:0                            3rd Qu.:0.00
##  Max.    :0         Max.    :0                            Max.    :8.00
##  NA's    :217291   NA's    :217291                      NA's    :157047
##   UsedComputer    UsedSmartPhone  ReadNewsPaper   LearningPlatforms
##  Min.    : 0.00   Min.    : 0.00   Min.    : 0.00   Min.    :1.00
##  1st Qu.: 0.00   1st Qu.: 0.00   1st Qu.: 0.00   1st Qu.:3.00
##  Median : 0.00   Median : 1.00   Median : 0.00   Median :3.00
##  Mean    : 0.43   Mean    : 1.21   Mean    : 1.04   Mean    :2.62
##  3rd Qu.: 0.00   3rd Qu.: 2.00   3rd Qu.: 2.00   3rd Qu.:3.00
##  Max.    :12.00   Max.    :11.00   Max.    :12.00   Max.    :3.00
##  NA's    :104213  NA's    :66822   NA's    :89503   NA's    :5862
##  FloodsAffected    MigrantIDP     ClimateChange   FloodImpacted
##  Min.    :0.000   Min.    :0.00   Min.    :1.000   Min.    :1.000
##  1st Qu.:0.000   1st Qu.:0.00   1st Qu.:1.000   1st Qu.:1.000
##  Median :0.000   Median :0.00   Median :2.000   Median :3.000
##  Mean    :0.195   Mean    :0.03   Mean    :2.013   Mean    :2.327
##  3rd Qu.:0.000   3rd Qu.:0.00   3rd Qu.:3.000   3rd Qu.:3.000
##  Max.    :1.000   Max.    :1.00   Max.    :3.000   Max.    :3.000
##  NA's    :28147   NA's    :32587   NA's    :6734    NA's    :6205
##  EarningImpacted PsychologicalImpacted TravelMode      TravelTime
##  Min.    :1.000   Min.    :1.000       Mode:logical   Min.    :1.00
##  1st Qu.:2.000   1st Qu.:2.000       NA's:290459    1st Qu.:1.00
##  Median :5.000   Median :4.000                      Median :1.00
##  Mean    :3.653   Mean    :2.973                      Mean    :1.34
##  3rd Qu.:5.000   3rd Qu.:4.000                      3rd Qu.:2.00
##  Max.    :5.000   Max.    :4.000                      Max.    :3.00
##  NA's    :5898    NA's    :5714                      NA's    :222089
##  NadraRegistration FormBRegistration ChangeSchool   ChangeSchoolReason
##  Min.    : 0.00    Min.    : 0.0      Min.    :0.00   Min.    : 1.00
##  1st Qu.: 2.00    1st Qu.: 2.0      1st Qu.:0.00   1st Qu.: 4.00
##  Median : 3.00    Median : 3.0      Median :0.00   Median : 8.00
##  Mean    : 2.96    Mean    : 2.9      Mean    :0.03   Mean    : 7.33
##  3rd Qu.: 4.00    3rd Qu.: 4.0      3rd Qu.:0.00   3rd Qu.:12.00
##  Max.    :12.00    Max.    :13.0      Max.    :1.00   Max.    :12.00
##  NA's    :59861    NA's    :64248     NA's    :217299 NA's    :289710
##  EducationExpense SchoolingAffected MotherLanguage      Religion
##  Min.    :   300   Min.    :1.00     Length:290459      Length:290459
##  1st Qu.:  2000   1st Qu.:3.00     Class :character   Class :character
##  Median :  3000   Median :4.00     Mode  :character   Mode  :character
##  Mean    :  5321   Mean    :3.52
##  3rd Qu.:  6000   3rd Qu.:4.00
##  Max.    :300000   Max.    :4.00
##  NA's    :78866    NA's    :220945
```

```
##  FunctionalToilet     SYEAR          AREA.y        RNAME.y
## Min.   :0.00    Min.   :2023   Min.   :2      Length:290459
## 1st Qu.:1.00    1st Qu.:2023   1st Qu.:2      Class :character
## Median :1.00    Median :2023   Median :2      Mode  :character
## Mean   :0.88    Mean   :2023   Mean   :2
## 3rd Qu.:1.00    3rd Qu.:2023   3rd Qu.:2
## Max.   :1.00    Max.   :2023   Max.   :2
## NA's   :92922   NA's   :1157   NA's   :1157
##   DNAME.y            VlgId         VlgCode            SID
## Length:290459    Min.   : 146   Length:290459    Min.   :    1
## Class :character 1st Qu.: 6025  Class :character 1st Qu.:1216
## Mode  :character Median : 7118  Mode  :character Median :2599
##                  Mean   : 7321                   Mean   :2846
##                  3rd Qu.: 8165                   3rd Qu.:4533
##                  Max.   :22818                   Max.   :6097
##                  NA's   :1157                    NA's   :1157
##     STYPE           S006            S00             S00a
## Min.   :1.000   Min.   :1.00    Min.   :1.000   Length:290459
## 1st Qu.:1.000   1st Qu.:1.00    1st Qu.:1.000   Class :character
## Median :1.000   Median :1.00    Median :1.000   Mode  :character
## Mean   :1.267   Mean   :1.13    Mean   :2.038
## 3rd Qu.:2.000   3rd Qu.:1.00    3rd Qu.:3.000
## Max.   :2.000   Max.   :4.00    Max.   :4.000
## NA's   :1157    NA's   :269037  NA's   :1157
##     S001            S002            S002a           S002Y
## Min.   :1.000   Min.   :1.000   Length:290459    Min.   :1829
## 1st Qu.:1.000   1st Qu.:1.000   Class :character 1st Qu.:1982
## Median :2.000   Median :2.000   Mode  :character Median :2000
## Mean   :1.633   Mean   :1.923                    Mean   :1994
## 3rd Qu.:2.000   3rd Qu.:2.000                    3rd Qu.:2011
## Max.   :3.000   Max.   :4.000                    Max.   :2023
## NA's   :1157    NA's   :11722                    NA's   :46234
##     S007E           S007P           S03a1           S03b1
## Min.   :  10.0  Min.   :   2.0  Min.   :0.000   Length:290459
## 1st Qu.:  83.0  1st Qu.:  67.0  1st Qu.:0.000   Class :character
## Median : 149.0  Median : 128.0  Median :0.000   Mode  :character
## Mean   : 200.5  Mean   : 178.1  Mean   :0.493
## 3rd Qu.: 243.0  3rd Qu.: 217.0  3rd Qu.:1.000
## Max.   :2342.0  Max.   :2196.0  Max.   :1.000
## NA's   :1157    NA's   :1157    NA's   :16456
##     S03f1           S03d1           S03e1           S03c1
## Min.   :0.000   Min.   :0.00    Min.   :0.000   Min.   :1.00
## 1st Qu.:0.000   1st Qu.:1.00    1st Qu.:1.000   1st Qu.:1.00
## Median :1.000   Median :1.00    Median :1.000   Median :1.00
## Mean   :0.712   Mean   :0.89    Mean   :0.815   Mean   :1.11
## 3rd Qu.:1.000   3rd Qu.:1.00    3rd Qu.:1.000   3rd Qu.:1.00
## Max.   :1.000   Max.   :1.00    Max.   :1.000   Max.   :3.00
## NA's   :20534   NA's   :20287   NA's   :17891   NA's   :76225
##     S03a2           S03b2           S03f2           S03d2
## Min.   :0.00    Length:290459    Min.   :0.00    Min.   :0.0
## 1st Qu.:0.00    Class :character 1st Qu.:0.00    1st Qu.:0.0
## Median :0.00    Mode  :character Median :1.00    Median :1.0
```

```
##    Mean   :0.18                        Mean   :0.51     Mean   :0.6
##    3rd Qu.:0.00                         3rd Qu.:1.00    3rd Qu.:1.0
##    Max.   :1.00                         Max.   :1.00    Max.   :1.0
##    NA's   :145881                       NA's   :151335  NA's   :151018
##       S03e2            S03c2              S004             S004VB1
##    Min.   :0.00    Min.   :1.00    Min.   :0.000    Min.   : 1.00
##    1st Qu.:0.00    1st Qu.:1.00    1st Qu.:0.000    1st Qu.: 1.00
##    Median :1.00    Median :1.00    Median :0.000    Median : 1.00
##    Mean   :0.57    Mean   :1.05    Mean   :0.125    Mean   : 2.31
##    3rd Qu.:1.00    3rd Qu.:1.00    3rd Qu.:0.000    3rd Qu.: 2.00
##    Max.   :1.00    Max.   :3.00    Max.   :1.000    Max.   :20.00
##    NA's   :150958  NA's   :178254  NA's   :25715    NA's   :277518
##      S004VB2          S004VB3            S004VG1           S004VG2
##    Min.   :1.00    Min.   :1.00    Min.   : 1.00    Min.   :1.00
##    1st Qu.:1.00    1st Qu.:1.00    1st Qu.: 1.00    1st Qu.:1.00
##    Median :1.00    Median :1.00    Median : 1.00    Median :1.00
##    Mean   :1.78    Mean   :1.66    Mean   : 1.84    Mean   :1.61
##    3rd Qu.:2.00    3rd Qu.:2.00    3rd Qu.: 2.00    3rd Qu.:2.00
##    Max.   :8.00    Max.   :8.00    Max.   :25.00    Max.   :9.00
##    NA's   :287767  NA's   :289714  NA's   :282811   NA's   :288924
##      S004VG3          S004HB1            S004HB2           S004HB3
##    Min.   :1.00    Min.   : 1.00    Min.   :1.00    Min.   :1.00
##    1st Qu.:1.00    1st Qu.: 1.00    1st Qu.:1.00    1st Qu.:1.00
##    Median :1.00    Median : 1.00    Median :1.00    Median :1.00
##    Mean   :1.38    Mean   : 1.75    Mean   :1.37    Mean   :1.46
##    3rd Qu.:1.00    3rd Qu.: 2.00    3rd Qu.:1.00    3rd Qu.:1.00
##    Max.   :6.00    Max.   :13.00    Max.   :8.00    Max.   :8.00
##    NA's   :290199  NA's   :279767   NA's   :288446  NA's   :289697
##      S004HG1          S004HG2            S004HG3           S004PB1
##    Min.   :1.00    Min.   :1.00    Min.   :1.00    Min.   : 1.00
##    1st Qu.:1.00    1st Qu.:1.00    1st Qu.:1.00    1st Qu.: 1.00
##    Median :1.00    Median :1.00    Median :1.00    Median : 1.00
##    Mean   :1.36    Mean   :1.31    Mean   :1.16    Mean   : 1.64
##    3rd Qu.:2.00    3rd Qu.:2.00    3rd Qu.:1.00    3rd Qu.: 2.00
##    Max.   :4.00    Max.   :6.00    Max.   :5.00    Max.   :11.00
##    NA's   :285828  NA's   :288916  NA's   :289945   NA's   :272390
##      S004PB2          S004PB3            S004PG1           S004PG2
##    Min.   :1.0     Min.   :1.00    Min.   :1.00    Min.   :1.00
##    1st Qu.:1.0     1st Qu.:1.00    1st Qu.:1.00    1st Qu.:1.00
##    Median :1.0     Median :1.00    Median :1.00    Median :1.00
##    Mean   :1.5     Mean   :1.54    Mean   :1.52    Mean   :1.34
##    3rd Qu.:1.0     3rd Qu.:1.00    3rd Qu.:2.00    3rd Qu.:1.00
##    Max.   :8.0     Max.   :7.00    Max.   :9.00    Max.   :7.00
##    NA's   :285256  NA's   :289059  NA's   :283549   NA's   :288102
##      S004PG3          S004IB1            S004IB2           S004IB3
##    Min.   :1.00    Min.   : 1.00    Min.   : 1.00    Min.   : 1.00
##    1st Qu.:1.00    1st Qu.: 1.00    1st Qu.: 1.00    1st Qu.: 1.00
##    Median :1.00    Median : 1.00    Median : 1.00    Median : 1.00
##    Mean   :1.59    Mean   : 2.43    Mean   : 1.63    Mean   : 1.87
##    3rd Qu.:1.00    3rd Qu.: 2.00    3rd Qu.: 1.00    3rd Qu.: 1.00
##    Max.   :6.00    Max.   :50.00    Max.   :30.00    Max.   :13.00
##    NA's   :289801  NA's   :283955   NA's   :287205   NA's   :289844
```

```
##     S004IG1          S004IG2          S004IG3          S004SCRB1
## Min.   : 1.00    Min.   :1.00     Min.   :1.00     Min.   : 1.00
## 1st Qu.: 1.00    1st Qu.:1.00     1st Qu.:1.00     1st Qu.: 1.00
## Median : 1.00    Median :1.00     Median :1.00     Median : 1.00
## Mean   : 1.88    Mean   :1.48     Mean   :1.14     Mean   : 2.93
## 3rd Qu.: 2.00    3rd Qu.:1.00     3rd Qu.:1.00     3rd Qu.: 2.00
## Max.   :12.00    Max.   :8.00     Max.   :3.00     Max.   :30.00
## NA's   :287053   NA's   :289575   NA's   :290180   NA's   :285957
##     S004SCRB2        S004SCRB3        S004SCRG1        S004SCRG2
## Min.   : 1.00    Min.   :1.00     Min.   : 1.00    Min.   :1.00
## 1st Qu.: 1.00    1st Qu.:1.00     1st Qu.: 1.00    1st Qu.:1.00
## Median : 2.00    Median :1.00     Median : 1.00    Median :1.00
## Mean   : 2.38    Mean   :1.54     Mean   : 2.56    Mean   :2.18
## 3rd Qu.: 2.00    3rd Qu.:2.00     3rd Qu.: 2.00    3rd Qu.:3.00
## Max.   :12.00    Max.   :4.00     Max.   :33.00    Max.   :7.00
## NA's   :289564   NA's   :289977   NA's   :288479   NA's   :290011
##     S004SCRG3        S004COTB1        S004COTB2        S004COTB3
## Min.   :1.00     Min.   : 1.00    Min.   : 1.00    Min.   : 1.00
## 1st Qu.:1.00     1st Qu.: 1.00    1st Qu.: 1.00    1st Qu.: 1.00
## Median :1.00     Median : 2.00    Median : 1.00    Median : 1.00
## Mean   :1.46     Mean   : 2.54    Mean   : 2.07    Mean   : 2.11
## 3rd Qu.:1.00     3rd Qu.: 3.00    3rd Qu.: 2.00    3rd Qu.: 1.00
## Max.   :3.00     Max.   :17.00    Max.   :17.00    Max.   :15.00
## NA's   :290121   NA's   :284219   NA's   :288606   NA's   :289707
##     S004COTG1        S004COTG2        S004COTG3         S004FR
## Min.   : 1.00    Min.   :1.00     Min.   :1.00     Min.   :0.00
## 1st Qu.: 1.00    1st Qu.:1.00     1st Qu.:1.00     1st Qu.:0.00
## Median : 1.00    Median :2.00     Median :1.00     Median :0.00
## Mean   : 2.01    Mean   :2.91     Mean   :1.24     Mean   :0.25
## 3rd Qu.: 2.00    3rd Qu.:5.00     3rd Qu.:1.00     3rd Qu.:1.00
## Max.   :16.00    Max.   :9.00     Max.   :5.00     Max.   :1.00
## NA's   :287972   NA's   :290130   NA's   :290125   NA's   :204276
##     S004FT           S004FHN          S004TSS          S004ADHI
## Min.   :0.00     Min.   :0.0      Min.   :0.00     Min.   :0.00
## 1st Qu.:0.00     1st Qu.:0.0      1st Qu.:0.00     1st Qu.:0.00
## Median :1.00     Median :0.0      Median :0.00     Median :0.00
## Mean   :0.52     Mean   :0.1      Mean   :0.24     Mean   :0.05
## 3rd Qu.:1.00     3rd Qu.:0.0      3rd Qu.:0.00     3rd Qu.:0.00
## Max.   :1.00     Max.   :1.0      Max.   :1.00     Max.   :1.00
## NA's   :187043   NA's   :187317   NA's   :187192   NA's   :187534
##     S004TF           S011Ob1          S011Ob2          S011Ob3
## Min.   :0.00     Min.   :0.000    Min.   :0.000    Min.   :0.000
## 1st Qu.:0.00     1st Qu.:1.000    1st Qu.:0.000    1st Qu.:1.000
## Median :0.00     Median :1.000    Median :1.000    Median :1.000
## Mean   :0.08     Mean   :0.773    Mean   :0.566    Mean   :0.765
## 3rd Qu.:0.00     3rd Qu.:1.000    3rd Qu.:1.000    3rd Qu.:1.000
## Max.   :1.00     Max.   :1.000    Max.   :1.000    Max.   :1.000
## NA's   :187641   NA's   :12619    NA's   :13058    NA's   :13465
##     S011Ob4          S011Ob5          S011Ob6          S011Ob7
## Min.   :0.000    Min.   :0.000    Min.   : 1.00    Min.   :0.00
## 1st Qu.:0.000    1st Qu.:0.000    1st Qu.: 1.00    1st Qu.:0.00
## Median :0.000    Median :0.000    Median : 1.00    Median :1.00
```

```
##    Mean   :0.272    Mean   :0.215    Mean   : 1.96    Mean   :0.72
##    3rd Qu.:1.000    3rd Qu.:0.000    3rd Qu.: 1.00    3rd Qu.:1.00
##    Max.   :1.000    Max.   :1.000    Max.   :90.00    Max.   :1.00
##    NA's   :14055    NA's   :15642    NA's   :233313   NA's   :15418
##      S011Ob8          S011Ob9          S011Ob10         S011Ob11
##    Min.   :0.00     Min.   :0.000    Min.   :0.0      Min.   :1.00
##    1st Qu.:0.00     1st Qu.:0.000    1st Qu.:0.0      1st Qu.:1.00
##    Median :1.00     Median :0.000    Median :0.0      Median :1.00
##    Mean   :0.51     Mean   :0.308    Mean   :0.5      Mean   :1.07
##    3rd Qu.:1.00     3rd Qu.:1.000    3rd Qu.:1.0      3rd Qu.:1.00
##    Max.   :1.00     Max.   :1.000    Max.   :1.0      Max.   :2.00
##    NA's   :36465    NA's   :23888    NA's   :213335   NA's   :205665
##      S011Ob12         S011Ob13         S011Ob14         S011Ob15
##    Min.   :0.000    Min.   :0.000    Min.   :0.00     Min.   :0.00
##    1st Qu.:0.000    1st Qu.:0.000    1st Qu.:0.00     1st Qu.:0.00
##    Median :1.000    Median :0.000    Median :1.00     Median :0.00
##    Mean   :0.718    Mean   :0.441    Mean   :0.64     Mean   :0.43
##    3rd Qu.:1.000    3rd Qu.:1.000    3rd Qu.:1.00     3rd Qu.:1.00
##    Max.   :1.000    Max.   :1.000    Max.   :1.00     Max.   :1.00
##    NA's   :15958    NA's   :17344    NA's   :64042    NA's   :63813
##      S011Ob16         S011Ob17         S011Ob18         S011Ob19
##    Min.   :0.000    Min.   :0.000    Min.   :0.000    Min.   :0.000
##    1st Qu.:0.000    1st Qu.:0.000    1st Qu.:0.000    1st Qu.:0.000
##    Median :1.000    Median :1.000    Median :0.000    Median :0.000
##    Mean   :0.656    Mean   :0.729    Mean   :0.165    Mean   :0.296
##    3rd Qu.:1.000    3rd Qu.:1.000    3rd Qu.:0.000    3rd Qu.:1.000
##    Max.   :1.000    Max.   :1.000    Max.   :1.000    Max.   :1.000
##    NA's   :16702    NA's   :15627    NA's   :16781    NA's   :15873
##      S011Ob20         S012Ob1          S012Ob2          S012Ob3
##    Min.   :0.000    Min.   : 1.000   Min.   : 1.000   Min.   :120.0
##    1st Qu.:0.000    1st Qu.: 3.000   1st Qu.: 3.000   1st Qu.:240.0
##    Median :0.000    Median : 6.000   Median : 5.000   Median :260.0
##    Mean   :0.135    Mean   : 7.814   Mean   : 6.487   Mean   :245.5
##    3rd Qu.:0.000    3rd Qu.: 10.000  3rd Qu.: 9.000   3rd Qu.:260.0
##    Max.   :1.000    Max.   :158.000  Max.   :156.000  Max.   :300.0
##    NA's   :20059    NA's   :17455    NA's   :19850    NA's   :26097
##      S012Ob4          S012Ob5          S012Ob6          S012Ob7
##    Min.   : 0.00    Min.   : 0.00    Min.   : 0.00    Min.   : 0.00
##    1st Qu.: 0.00    1st Qu.: 0.00    1st Qu.: 1.00    1st Qu.: 1.00
##    Median : 1.00    Median : 1.00    Median : 1.00    Median : 1.00
##    Mean   : 1.69    Mean   : 1.44    Mean   : 1.72    Mean   : 1.62
##    3rd Qu.: 2.00    3rd Qu.: 2.00    3rd Qu.: 2.00    3rd Qu.: 2.00
##    Max.   :23.00    Max.   :16.00    Max.   :22.00    Max.   :21.00
##    NA's   :198649   NA's   :187857   NA's   :150274   NA's   :167642
##      S012Ob8          S012Ob11         S012Ob12         S012Ob13
##    Min.   : 0.00    Min.   : 0.0     Min.   :0.00     Min.   :0.00
##    1st Qu.: 1.00    1st Qu.: 0.0     1st Qu.:0.00     1st Qu.:0.00
##    Median : 1.00    Median : 1.0     Median :0.00     Median :0.00
##    Mean   : 2.35    Mean   : 1.5     Mean   :0.15     Mean   :0.17
##    3rd Qu.: 3.00    3rd Qu.: 2.0     3rd Qu.:0.00     3rd Qu.:0.00
##    Max.   :50.00    Max.   :20.0     Max.   :1.00     Max.   :1.00
##    NA's   :165235   NA's   :215704   NA's   :35781    NA's   :42952
```

```
##       S012Ob14              S012Ob15              S012Ob16               S008TA
##  Min.    :0.00        Min.    :0.00        Min.    :0.00        Min.    :   1.000
##  1st Qu.:0.00         1st Qu.:1.00         1st Qu.:0.00         1st Qu.:   4.000
##  Median :1.00         Median :1.00         Median :0.00         Median :   7.000
##  Mean    :0.63        Mean    :0.84        Mean    :0.34        Mean    :   9.341
##  3rd Qu.:1.00         3rd Qu.:1.00         3rd Qu.:1.00         3rd Qu.:  13.000
##  Max.    :1.00        Max.    :1.00        Max.    :1.00        Max.    :135.000
##  NA's    :252077      NA's    :251327      NA's    :254985      NA's    :12248
##       S008TP               S009b                S009c                 S009d
##  Min.    :   0.00     Min.    :   0.00     Min.    :   0.0      Min.    :   0.00
##  1st Qu.:   2.00      1st Qu.:   1.00      1st Qu.:   1.0       1st Qu.:   1.00
##  Median :   5.00      Median :   2.00      Median :   2.0       Median :   2.00
##  Mean    :   7.35     Mean    :   2.01     Mean    :   2.4      Mean    :   3.47
##  3rd Qu.:  10.00      3rd Qu.:   2.00      3rd Qu.:   3.0       3rd Qu.:   4.00
##  Max.    :134.00      Max.    :  12.00     Max.    :  21.0      Max.    :  35.00
##  NA's    :12248       NA's    :250483      NA's    :184438      NA's    :93373
##       S009e                S009f                S009g                 S009z
##  Min.    :   0.00     Min.    :   0.00     Min.    :1           Min.    :   0.00
##  1st Qu.:   2.00      1st Qu.:   1.00      1st Qu.:1            1st Qu.:   1.00
##  Median :   3.00      Median :   1.00      Median :1            Median :   1.00
##  Mean    :   4.56     Mean    :   1.91     Mean    :1           Mean    :   1.93
##  3rd Qu.:   6.00      3rd Qu.:   2.00      3rd Qu.:1            3rd Qu.:   2.00
##  Max.    :  44.00     Max.    :  23.00     Max.    :1           Max.    :  10.00
##  NA's    :84042       NA's    :243394      NA's    :290206      NA's    :285203
##       S010c                S010b                S010d                 S010e
##  Min.    :   0.00     Min.    :   0.00     Min.    :   0.00     Min.    :   0.00
##  1st Qu.:   1.00      1st Qu.:   1.00      1st Qu.:   1.00      1st Qu.:   1.00
##  Median :   2.00      Median :   2.00      Median :   2.00      Median :   2.00
##  Mean    :   2.29     Mean    :   2.44     Mean    :   3.72     Mean    :   3.04
##  3rd Qu.:   3.00      3rd Qu.:   3.00      3rd Qu.:   4.00      3rd Qu.:   3.00
##  Max.    :  42.00     Max.    :  30.00     Max.    :  56.00     Max.    :  34.00
##  NA's    :206409      NA's    :191083      NA's    :80499       NA's    :129038
##       S010z                S014h1               S014h2                S014h3
##  Min.    :   0.00     Min.    :   0.00     Min.    :   0.00     Min.    :   0.00
##  1st Qu.:   0.00      1st Qu.:   1.00      1st Qu.:   1.00      1st Qu.:   1.00
##  Median :   1.00      Median :   1.00      Median :   2.00      Median :   1.00
##  Mean    :   1.21     Mean    :   3.07     Mean    :   2.99     Mean    :   3.11
##  3rd Qu.:   1.00      3rd Qu.:   3.00      3rd Qu.:   3.00      3rd Qu.:   3.00
##  Max.    :  30.00     Max.    :  46.00     Max.    :  31.00     Max.    :  38.00
##  NA's    :250036      NA's    :186452      NA's    :198395      NA's    :227382
##       S014h4               S014a                S014c                 S014d
##  Min.    :   0.00     Min.    :0.0         Min.    :   1.00     Min.    :   1.00
##  1st Qu.:   1.00      1st Qu.:0.0          1st Qu.:   6.00      1st Qu.:   5.00
##  Median :   2.00      Median :1.0          Median :   8.00      Median :   7.00
##  Mean    :   4.42     Mean    :0.6         Mean    :   7.95     Mean    :   6.63
##  3rd Qu.:   4.00      3rd Qu.:1.0          3rd Qu.:   9.00      3rd Qu.:   8.00
##  Max.    :  90.00     Max.    :1.0         Max.    :  80.00     Max.    :  80.00
##  NA's    :260594      NA's    :108086      NA's    :170641      NA's    :170641
##       S014e                S014f                S014g                 S013a
##  Min.    :    1059    Min.    :   1.00     Min.    :1900        Min.    :1.000
##  1st Qu.:   17000     1st Qu.:   5.00      1st Qu.:2000         1st Qu.:1.000
##  Median :   38000     Median :   8.00      Median :2013         Median :2.000
```

```
##   Mean   :  76121   Mean   : 15.11   Mean   :2006    Mean   :2.326
##   3rd Qu.:  72000   3rd Qu.: 16.00   3rd Qu.:2019    3rd Qu.:4.000
##   Max.   :1078692   Max.   :300.00   Max.   :2023    Max.   :5.000
##   NA's   :225149    NA's   :193410   NA's   :192496  NA's   :7454
##      S013b             S013c             S013d             S013e
##   Min.   :0.0      Min.   :0.00     Min.   :0.00     Min.   :  1.0
##   1st Qu.:0.0      1st Qu.:2.00     1st Qu.:0.00     1st Qu.:  8.0
##   Median :1.0      Median :2.00     Median :0.00     Median : 20.0
##   Mean   :0.6      Mean   :2.48     Mean   :0.27     Mean   : 22.6
##   3rd Qu.:1.0      3rd Qu.:3.00     3rd Qu.:1.00     3rd Qu.: 26.0
##   Max.   :1.0      Max.   :5.00     Max.   :1.00     Max.   :132.0
##   NA's   :46505    NA's   :50837    NA's   :53069    NA's   :227449
##      SURID
##   Min.   : 10054
##   1st Qu.:192039
##   Median :264842
##   Mean   :212370
##   3rd Qu.:265953
##   Max.   :317067
##   NA's   :1157
```

```
head(child_house_school)
```

```
##          Id RNAME.x PrvCode DNAME.x DstCode VCODES C03 C04 C05 C06  C08  C09 C10
## 1 1532002  PUNJAB       1  VEHARI      35   6578  11   1   3   7 NULL NULL   7
## 2 1532002  PUNJAB       1  VEHARI      35   6578  11   1   3   7 NULL NULL   7
## 3 1532003  PUNJAB       1  VEHARI      35   6578   7   1   3   2 NULL NULL   3
## 4 1532003  PUNJAB       1  VEHARI      35   6578   7   1   3   2 NULL NULL   3
## 5 1532004  PUNJAB       1  VEHARI      35   6578   4  NA  NA      NULL NULL ECE
## 6 1532004  PUNJAB       1  VEHARI      35   6578   4  NA  NA      NULL NULL ECE
##   C11 C12 C07 C13  C14 C15 C16 B17 C18 C19 C23 C24 C25 C20 C21 C22 C26a C26b
## 1   1   0   0   1  500   3  NA  NA   1   7   1   0   0   4   1  NA    0    1
## 2   1   0   0   1  500   3  NA  NA   1   7   1   0   0   4   1  NA    0    1
## 3   2   0   0   1  300   2  NA  NA   1   5   1   0   0   3  NA  NA   NA   NA
## 4   2   0   0   1  300   2  NA  NA   1   5   1   0   0   3  NA  NA   NA   NA
## 5  NA   0   0   0 NULL  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   NA   NA
## 6  NA   0   0   0 NULL  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   NA   NA
##   C27 PRID ICH01     ICH02 ICH03 ICH05 BasicVaccines Allergies C28 Polio
## 1   1    1     2     Other     1     0  All vaccines      NULL  NA     1
## 2   1    1     2     Other     1     0  All vaccines      NULL  NA     1
## 3  NA    1     1 Allergies     1     0  All vaccines      NULL  NA     1
## 4  NA    1     1 Allergies     1     0  All vaccines      NULL  NA     1
## 5  NA    1     2     Other     2     0  All vaccines      NULL  NA     1
## 6  NA    1     2     Other     2     0  All vaccines      NULL  NA     1
##   DPT_HepB_Hib Pneumococcal Measles BCG AREA.x    HHID VMAPID HouseholdCounter
## 1            1            1       1   1  rural 1365063 264391                1
## 2            1            1       1   1  rural 1365063 264391                1
## 3            1            1       1   1  rural 1365063 264391                1
## 4            1            1       1   1  rural 1365063 264391                1
## 5            1            1       1   1  rural 1365063 264391                1
## 6            1            1       1   1  rural 1365063 264391                1
##   IsFamilyHead Gender MaleMembers FemaleMembers EarningMembers
## 1            0      1           2             3              1
## 2            0      1           2             3              1
## 3            0      1           2             3              1
## 4            0      1           2             3              1
## 5            0      1           2             3              1
## 6            0      1           2             3              1
##   EarningMembersChild HouseType IsHouseOwned IsElectricityConnectionAvailable
## 1                  NA         3            1                                1
## 2                  NA         3            1                                1
## 3                  NA         3            1                                1
## 4                  NA         3            1                                1
## 5                  NA         3            1                                1
## 6                  NA         3            1                                1
##   IsTVAvailable IsRadioAvailable IsMobileAvailable IsSmartPhoneAvailable Car
## 1             0                0                 1                     1  NA
## 2             0                0                 1                     1  NA
## 3             0                0                 1                     1  NA
## 4             0                0                 1                     1  NA
## 5             0                0                 1                     1  NA
## 6             0                0                 1                     1  NA
##   MotorCycle IsInternetAvailable IsComputerAvailable IsSolarPanelAvailable
## 1          1                   0                   0                     0
## 2          1                   0                   0                     0
```

```
## 3               1                   0                   0                      0
## 4               1                   0                   0                      0
## 5               1                   0                   0                      0
## 6               1                   0                   0                      0
##   UseSms UseWhatsApp IsRecipientBISP IsRecipientPSPA IsRecipientAkhuwat
## 1      1           1               0               0                  0
## 2      1           1               0               0                  0
## 3      1           1               0               0                  0
## 4      1           1               0               0                  0
## 5      1           1               0               0                  0
## 6      1           1               0               0                  0
##   IsRecipientEhsaas IsRecipientOther TotalFuctionalToilets IsTap IsBore
## 1                 0                0                    NA     0      0
## 2                 0                0                    NA     0      0
## 3                 0                0                    NA     0      0
## 4                 0                0                    NA     0      0
## 5                 0                0                    NA     0      0
## 6                 0                0                    NA     0      0
##   IsFilter IsToba IsChashma IsOther IsToiletAvailable CarOther UsedComputer
## 1        0      0         0       0                 1       NA           NA
## 2        0      0         0       0                 1       NA           NA
## 3        0      0         0       0                 1       NA           NA
## 4        0      0         0       0                 1       NA           NA
## 5        0      0         0       0                 1       NA           NA
## 6        0      0         0       0                 1       NA           NA
##   UsedSmartPhone ReadNewsPaper LearningPlatforms FloodsAffected MigrantIDP
## 1              2             2                NA              0          0
## 2              2             2                NA              0          0
## 3              2             2                NA              0          0
## 4              2             2                NA              0          0
## 5              2             2                NA              0          0
## 6              2             2                NA              0          0
##   ClimateChange FloodImpacted EarningImpacted PsychologicalImpacted TravelMode
## 1             2             3               4                    NA         NA
## 2             2             3               4                    NA         NA
## 3             2             3               4                    NA         NA
## 4             2             3               4                    NA         NA
## 5             2             3               4                    NA         NA
## 6             2             3               4                    NA         NA
##   TravelTime NadraRegistration FormBRegistration ChangeSchool
## 1         NA                 3                 3            0
## 2         NA                 3                 3            0
## 3         NA                 3                 3            0
## 4         NA                 3                 3            0
## 5         NA                 3                 3            0
## 6         NA                 3                 3            0
##   ChangeSchoolReason EducationExpense SchoolingAffected MotherLanguage Religion
## 1                 NA              600                NA         Sindhi    Islam
## 2                 NA              600                NA         Sindhi    Islam
## 3                 NA              600                NA         Sindhi    Islam
## 4                 NA              600                NA         Sindhi    Islam
## 5                 NA              600                NA         Sindhi    Islam
```

```
## 6                   NA            600               NA     Sindhi   Islam
##   FunctionalToilet SYEAR AREA.y
## 1               NA  2023      2
## 2               NA  2023      2
## 3               NA  2023      2
## 4               NA  2023      2
## 5               NA  2023      2
## 6               NA  2023      2
##                                          RNAME.y DNAME.y VlgId VlgCode  SID
## 1 PUNJAB                                          VEHARI   6578    1653 3054
## 2 PUNJAB                                          VEHARI   6578    1653 5555
## 3 PUNJAB                                          VEHARI   6578    1653 3054
## 4 PUNJAB                                          VEHARI   6578    1653 5555
## 5 PUNJAB                                          VEHARI   6578    1653 3054
## 6 PUNJAB                                          VEHARI   6578    1653 5555
##   STYPE S006 S00 S00a S001 S002 S002a S002Y S007E S007P S03a1 S03b1 S03f1 S03d1
## 1     1   NA   3 NULL    2    2        1965  1058   990     0           1     1
## 2     2    1   3         1    2        2012   336   336     1           0     0
## 3     1   NA   3 NULL    2    2        1965  1058   990     0           1     1
## 4     2    1   3         1    2        2012   336   336     1           0     0
## 5     1   NA   3 NULL    2    2        1965  1058   990     0           1     1
## 6     2    1   3         1    2        2012   336   336     1           0     0
##   S03e1 S03c1 S03a2 S03b2 S03f2 S03d2 S03e2 S03c2 S004 S004VB1 S004VB2 S004VB3
## 1     1    NA     0     1     1     1     1     1    0      NA      NA      NA
## 2     0     1     1     0     0     0     0     1    0      NA      NA      NA
## 3     1    NA     0     1     1     1     1     1    0      NA      NA      NA
## 4     0     1     1     0     0     0     0     1    0      NA      NA      NA
## 5     1    NA     0     1     1     1     1     1    0      NA      NA      NA
## 6     0     1     1     0     0     0     0     1    0      NA      NA      NA
##   S004VG1 S004VG2 S004VG3 S004HB1 S004HB2 S004HB3 S004HG1 S004HG2 S004HG3
## 1      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 2      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 3      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 4      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 5      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 6      NA      NA      NA      NA      NA      NA      NA      NA      NA
##   S004PB1 S004PB2 S004PB3 S004PG1 S004PG2 S004PG3 S004IB1 S004IB2 S004IB3
## 1      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 2      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 3      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 4      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 5      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 6      NA      NA      NA      NA      NA      NA      NA      NA      NA
##   S004IG1 S004IG2 S004IG3 S004SCRB1 S004SCRB2 S004SCRB3 S004SCRG1 S004SCRG2
## 1      NA      NA      NA        NA        NA        NA        NA        NA
## 2      NA      NA      NA        NA        NA        NA        NA        NA
## 3      NA      NA      NA        NA        NA        NA        NA        NA
## 4      NA      NA      NA        NA        NA        NA        NA        NA
## 5      NA      NA      NA        NA        NA        NA        NA        NA
## 6      NA      NA      NA        NA        NA        NA        NA        NA
##   S004SCRG3 S004COTB1 S004COTB2 S004COTB3 S004COTG1 S004COTG2 S004COTG3 S004FR
## 1        NA        NA        NA        NA        NA        NA        NA      0
```

```
## 2        NA      NA      NA       NA      NA      NA       NA       0
## 3        NA      NA      NA       NA      NA      NA       NA       0
## 4        NA      NA      NA       NA      NA      NA       NA       0
## 5        NA      NA      NA       NA      NA      NA       NA       0
## 6        NA      NA      NA       NA      NA      NA       NA       0
##   S004FT S004FHN S004TSS S004ADHI S004TF S011Ob1 S011Ob2 S011Ob3 S011Ob4
## 1      0       0       0        0      0       1       1       1       1
## 2      1       0       1        0      0       1       1       1       0
## 3      0       0       0        0      0       1       1       1       1
## 4      1       0       1        0      0       1       1       1       0
## 5      0       0       0        0      0       1       1       1       1
## 6      1       0       1        0      0       1       1       1       0
##   S011Ob5 S011Ob6 S011Ob7 S011Ob8 S011Ob9 S011Ob10 S011Ob11 S011Ob12 S011Ob13
## 1       1      NA       1       1       0       NA       NA        1        0
## 2       0      NA       1      NA       0       NA       NA        1        1
## 3       1      NA       1       1       0       NA       NA        1        0
## 4       0      NA       1      NA       0       NA       NA        1        1
## 5       1      NA       1       1       0       NA       NA        1        0
## 6       0      NA       1      NA       0       NA       NA        1        1
##   S011Ob14 S011Ob15 S011Ob16 S011Ob17 S011Ob18 S011Ob19 S011Ob20 S012Ob1
## 1       NA       NA        1        1        1        1        1      14
## 2        1        1        1        1        0        0        1      20
## 3       NA       NA        1        1        1        1        1      14
## 4        1        1        1        1        0        0        1      20
## 5       NA       NA        1        1        1        1        1      14
## 6        1        1        1        1        0        0        1      20
##   S012Ob2 S012Ob3 S012Ob4 S012Ob5 S012Ob6 S012Ob7 S012Ob8 S012Ob11 S012Ob12
## 1      11     224       1       1      NA       8      50       NA        1
## 2      16     270      NA      NA       1       1      NA       NA        0
## 3      11     224       1       1      NA       8      50       NA        1
## 4      16     270      NA      NA       1       1      NA       NA        0
## 5      11     224       1       1      NA       8      50       NA        1
## 6      16     270      NA      NA       1       1      NA       NA        0
##   S012Ob13 S012Ob14 S012Ob15 S012Ob16 S008TA S008TP S009b S009c S009d S009e
## 1        1        1        1        0     29     25    NA    NA     4    16
## 2        1        0        1        0     26     25    NA    NA     5    19
## 3        1        1        1        0     29     25    NA    NA     4    16
## 4        1        0        1        0     26     25    NA    NA     5    19
## 5        1        1        1        0     29     25    NA    NA     4    16
## 6        1        0        1        0     26     25    NA    NA     5    19
##   S009f S009g S009z S010c S010b S010d S010e S010z S014h1 S014h2 S014h3 S014h4
## 1     4    NA    NA    NA    NA    18     6    NA     NA     12      2     NA
## 2     2    NA    NA    NA    NA     8     2     0      1     NA     NA     20
## 3     4    NA    NA    NA    NA    18     6    NA     NA     12      2     NA
## 4     2    NA    NA    NA    NA     8     2     0      1     NA     NA     20
## 5     4    NA    NA    NA    NA    18     6    NA     NA     12      2     NA
## 6     2    NA    NA    NA    NA     8     2     0      1     NA     NA     20
##   S014a S014c S014d  S014e S014f S014g S013a S013b S013c S013d S013e   SURID
## 1     1    17    10 185000     9  1980     2     1     1     0    NA   10094
## 2    NA    NA    NA     NA    NA    NA     3     0     3     0    NA  264391
## 3     1    17    10 185000     9  1980     2     1     1     0    NA   10094
## 4    NA    NA    NA     NA    NA    NA     3     0     3     0    NA  264391
```

```
## 5     1    17    10 185000    9  1980    2    1    1    0   NA  10094
## 6    NA    NA    NA    NA    NA    NA    3    0    3    0   NA 264391
```

```r
child_house_school <- child_house_school %>%
  select(-c(RNAME.x)) %>% # Removing the RNAME.x column as it is redundant and not neede
d
  rename(RNAME = RNAME.y) %>% # Renaming the RNAME.y column to RNAME for better understa
nding
  select(-c(DNAME.x)) %>% # Removing the DNAME.x column as it is redundant and not neede
d
  rename(DNAME = DNAME.y) # Renaming the DNAME.y column to DNAME for better understandin
g

child_house_school <- child_house_school %>%
  select(-c(AREA.x)) %>% # Removing the AREA.x column as it is redundant and not needed
  rename(AREA = AREA.y) # Renaming the AREA.y column to AREA for better understanding

colnames(child_house_school) # Checking the column names of the final dataset
```

```
##   [1] "Id"                             "PrvCode"
##   [3] "DstCode"                        "VCODES"
##   [5] "C03"                            "C04"
##   [7] "C05"                            "C06"
##   [9] "C08"                            "C09"
##  [11] "C10"                            "C11"
##  [13] "C12"                            "C07"
##  [15] "C13"                            "C14"
##  [17] "C15"                            "C16"
##  [19] "B17"                            "C18"
##  [21] "C19"                            "C23"
##  [23] "C24"                            "C25"
##  [25] "C20"                            "C21"
##  [27] "C22"                            "C26a"
##  [29] "C26b"                           "C27"
##  [31] "PRID"                           "ICH01"
##  [33] "ICH02"                          "ICH03"
##  [35] "ICH05"                          "BasicVaccines"
##  [37] "Allergies"                      "C28"
##  [39] "Polio"                          "DPT_HepB_Hib"
##  [41] "Pneumococcal"                   "Measles"
##  [43] "BCG"                            "HHID"
##  [45] "VMAPID"                         "HouseholdCounter"
##  [47] "IsFamilyHead"                   "Gender"
##  [49] "MaleMembers"                    "FemaleMembers"
##  [51] "EarningMembers"                 "EarningMembersChild"
##  [53] "HouseType"                      "IsHouseOwned"
##  [55] "IsElectricityConnectionAvailable" "IsTVAvailable"
##  [57] "IsRadioAvailable"               "IsMobileAvailable"
##  [59] "IsSmartPhoneAvailable"          "Car"
##  [61] "MotorCycle"                     "IsInternetAvailable"
##  [63] "IsComputerAvailable"            "IsSolarPanelAvailable"
##  [65] "UseSms"                         "UseWhatsApp"
##  [67] "IsRecipientBISP"                "IsRecipientPSPA"
##  [69] "IsRecipientAkhuwat"             "IsRecipientEhsaas"
##  [71] "IsRecipientOther"               "TotalFuctionalToilets"
##  [73] "IsTap"                          "IsBore"
##  [75] "IsFilter"                       "IsToba"
##  [77] "IsChashma"                      "IsOther"
##  [79] "IsToiletAvailable"              "CarOther"
##  [81] "UsedComputer"                   "UsedSmartPhone"
##  [83] "ReadNewsPaper"                  "LearningPlatforms"
##  [85] "FloodsAffected"                 "MigrantIDP"
##  [87] "ClimateChange"                  "FloodImpacted"
##  [89] "EarningImpacted"                "PsychologicalImpacted"
##  [91] "TravelMode"                     "TravelTime"
##  [93] "NadraRegistration"              "FormBRegistration"
##  [95] "ChangeSchool"                   "ChangeSchoolReason"
##  [97] "EducationExpense"               "SchoolingAffected"
##  [99] "MotherLanguage"                 "Religion"
## [101] "FunctionalToilet"               "SYEAR"
## [103] "AREA"                           "RNAME"
```

```
## [105] "DNAME"          "VlgId"
## [107] "VlgCode"         "SID"
## [109] "STYPE"           "S006"
## [111] "S00"             "S00a"
## [113] "S001"            "S002"
## [115] "S002a"           "S002Y"
## [117] "S007E"           "S007P"
## [119] "S03a1"           "S03b1"
## [121] "S03f1"           "S03d1"
## [123] "S03e1"           "S03c1"
## [125] "S03a2"           "S03b2"
## [127] "S03f2"           "S03d2"
## [129] "S03e2"           "S03c2"
## [131] "S004"            "S004VB1"
## [133] "S004VB2"         "S004VB3"
## [135] "S004VG1"         "S004VG2"
## [137] "S004VG3"         "S004HB1"
## [139] "S004HB2"         "S004HB3"
## [141] "S004HG1"         "S004HG2"
## [143] "S004HG3"         "S004PB1"
## [145] "S004PB2"         "S004PB3"
## [147] "S004PG1"         "S004PG2"
## [149] "S004PG3"         "S004IB1"
## [151] "S004IB2"         "S004IB3"
## [153] "S004IG1"         "S004IG2"
## [155] "S004IG3"         "S004SCRB1"
## [157] "S004SCRB2"       "S004SCRB3"
## [159] "S004SCRG1"       "S004SCRG2"
## [161] "S004SCRG3"       "S004COTB1"
## [163] "S004COTB2"       "S004COTB3"
## [165] "S004COTG1"       "S004COTG2"
## [167] "S004COTG3"       "S004FR"
## [169] "S004FT"          "S004FHN"
## [171] "S004TSS"         "S004ADHI"
## [173] "S004TF"          "S011Ob1"
## [175] "S011Ob2"         "S011Ob3"
## [177] "S011Ob4"         "S011Ob5"
## [179] "S011Ob6"         "S011Ob7"
## [181] "S011Ob8"         "S011Ob9"
## [183] "S011Ob10"        "S011Ob11"
## [185] "S011Ob12"        "S011Ob13"
## [187] "S011Ob14"        "S011Ob15"
## [189] "S011Ob16"        "S011Ob17"
## [191] "S011Ob18"        "S011Ob19"
## [193] "S011Ob20"        "S012Ob1"
## [195] "S012Ob2"         "S012Ob3"
## [197] "S012Ob4"         "S012Ob5"
## [199] "S012Ob6"         "S012Ob7"
## [201] "S012Ob8"         "S012Ob11"
## [203] "S012Ob12"        "S012Ob13"
## [205] "S012Ob14"        "S012Ob15"
## [207] "S012Ob16"        "S008TA"
```

```
## [209] "S008TP"                    "S009b"
## [211] "S009c"                    "S009d"
## [213] "S009e"                    "S009f"
## [215] "S009g"                    "S009z"
## [217] "S010c"                    "S010b"
## [219] "S010d"                    "S010e"
## [221] "S010z"                    "S014h1"
## [223] "S014h2"                   "S014h3"
## [225] "S014h4"                   "S014a"
## [227] "S014c"                    "S014d"
## [229] "S014e"                    "S014f"
## [231] "S014g"                    "S013a"
## [233] "S013b"                    "S013c"
## [235] "S013d"                    "S013e"
## [237] "SURID"
```

4.2 Selecting the Required Columns

```r
# --- 1. Selecting Relevant Variables from Household-Level, Child-Level, and School-Level Observations ---
child_house_school <- child_house_school %>%
  select(
    # Dataset Identifiers
    HHID, VMAPID, Id, AREA, RNAME, DNAME,

    # Household Characteristics
    HouseType, HouseholdCounter, EarningMembers, Car, MotorCycle,

    # Time to school
    TravelTime,

    # Climate Change Impact
    ClimateChange, FloodImpacted, EarningImpacted, PsychologicalImpacted, SchoolingAffected,

    # School Characteristics - SchoolType, TeachersAppointed, TeachersPresent, SingleOrCoEdSchool, InstructionMedium, ChildrenEnrolled, ChildrenPresent
    STYPE, S008TA, S008TP, S001, S002, S007E, S007P,

    # Child Characteristics - EducationalStatus, Grades, InstitutionType, LocalLangReadingLevel, ArithmeticLevel, EnglishReadingLevel
    VCODES, C05, C12, C10, C11, C15, C19, C20
  ) %>%
  rename(
    # School Characteristics - SchoolType, TeachersAppointed, TeachersPresent, SingleOrCoEdSchool, InstructionMedium, ChildrenEnrolled, ChildrenPresent
    SchoolType = STYPE, TeachersAppointed = S008TA, TeachersPresent = S008TP, SingleOrCoEdSchool = S001, InstructionMedium = S002, ChildrenEnrolled = S007E, ChildrenPresent = S007P,

    # Child Characteristics - EducationalStatus, Grades, InstitutionType, LocalLangReadingLevel, ArithmeticLevel, EnglishReadingLevel
    EducationalStatus = C05, Grades = C10, SurveyedChildToSchool = C12, InstitutionType = C11, LocalLangReadingLevel = C15, ArithmeticLevel = C19, EnglishReadingLevel = C20

  )
```

4.3 Filtering Out Values

```r
# --- 1. Filter by NAs and Replacing Some NA Values with 0 where applies ---
child_house_school_filtered <- child_house_school %>%
  filter(!is.na(HouseType), !is.na(HouseholdCounter), !is.na(EarningMembers), !is.na(Car), !is.na(MotorCycle), !is.na(TravelTime), !is.na(ClimateChange), !is.na(FloodImpacted), !is.na(EarningImpacted), !is.na(PsychologicalImpacted), !is.na(SchoolingAffected)) %>%
  mutate(
  TeachersAppointed = replace(TeachersAppointed, is.na(TeachersAppointed), 0),
  TeachersPresent = replace(TeachersPresent, is.na(TeachersPresent), 0),
  SchoolType = replace(SchoolType, is.na(SchoolType), 0),
  SingleOrCoEdSchool = replace(SingleOrCoEdSchool, is.na(SingleOrCoEdSchool), 0),
  InstructionMedium = replace(InstructionMedium, is.na(InstructionMedium), 0),
  ChildrenEnrolled = replace(ChildrenEnrolled, is.na(ChildrenEnrolled), 0),
  ChildrenPresent = replace(ChildrenPresent, is.na(ChildrenPresent), 0)
)

# --- 2. Filtering Data Based on Whether the Child Went to Surveyed School or Not  ---

# This is an important relational step as the data contains observations where the child
was surveyed but the school was not surveyed and vice versa. Hence, we want to focus on
understanding the relational aspect where each observation corresponds to the other observation.

child_house_school_filtered <- child_house_school_filtered %>%
  filter((SurveyedChildToSchool != 0)) # Filtering out only those children who were surveyed and their schools were surveyed as well
```

4.4 Making Data Types Consistent

```r
child_house_school_filtered <- child_house_school_filtered %>%
  mutate_if(is.character, as.factor) %>% # Convert character columns to factors
  mutate_if(is.numeric, as.integer) # Convert numeric columns to integers
```

4.5 Recoding Variables

```r
# Recoding the SchoolType, SingleOrCoEdSchool, InstructionMedium, EducationalStatus, Gra
des InstitutionType, ClimateChange, FloodImpacted, EarningImpacted, PsychologicalImpacte
d, SchoolingAffected, LocalLangReadingLevel, ArithmeticLevel, EnglishReadingLevel, House
Type variables to make them more understandable

child_house_school_filtered <- child_house_school_filtered %>%
  mutate(
    SchoolType = recode(SchoolType, "1" = "Government", "2" = "Private"),
    SchoolType = as.factor(SchoolType)
    ) %>%
  mutate(
    SingleOrCoEdSchool = recode(SingleOrCoEdSchool, "1" = "Boys and Girls School", "2" =
"Girls School", "3" = "Boys School"),
    SingleOrCoEdSchool = as.factor(SingleOrCoEdSchool)
  ) %>%
  mutate(
    InstructionMedium = recode(InstructionMedium, "1" = "English Medium", "2" = "Urdu Me
dium", "3" = "Sindhi Medium", "4" = "Others"),
    InstructionMedium = as.factor(InstructionMedium)
  ) %>%
  mutate(
    EducationalStatus = recode(EducationalStatus, "1" = "Never Enrolled", "2" = "Drop Ou
t", "3" = "Currently Enrolled"),
    EducationalStatus = as.factor(EducationalStatus)
  ) %>%
  mutate(
    Grades = recode(Grades, "1" = "Grade 1", "2" = "Grade 2", "3" = "Grade 3", "4" = "Gr
ade 4", "5" = "Grade 5", "6" = "Grade 6", "7" = "Grade 7", "8" = "Grade 8", "9" = "Grade
9", "10" = "Grade 10", "11" = "Grade 11", "12" = "Grade 12", "ECE" = "Early Childhood Ed
ucation"),
    Grades = as.factor(Grades)
  ) %>%
  mutate(
    InstitutionType = recode(InstitutionType, "1" = "Government School", "2" = "Private
School", "3" = "Madrassah", "4" = "Non-Formal Education"),
    InstitutionType = as.factor(InstitutionType)
  ) %>%
  mutate(
    ClimateChange = recode(ClimateChange, "1" = "Informed", "2" = "Don't Know", "3" = "U
ninformed"),
    ClimateChange = as.factor(ClimateChange)
  ) %>%
  mutate(
    FloodImpacted = recode(FloodImpacted, "1" = "Yes, significantly", "2" = "Yes, modera
tely", "3" = "No, not affected"),
    FloodImpacted = as.factor(FloodImpacted)
  ) %>%
  mutate(
    EarningImpacted = recode(EarningImpacted, "1" = "Less than 10%", "2" = "Between 11%
- 25%", "3" = "Between 26% - 50%", "4" = "More than 50%", "5" = "Not Affected"),
```

```
    EarningImpacted = as.factor(EarningImpacted)
  ) %>%
  mutate(
    PsychologicalImpacted = recode(PsychologicalImpacted, "1" = "Substantially", "2" =
"Somewhat Affected", "3" = "Not Affected", "4" = "Not Affected"),
    PsychologicalImpacted = as.factor(PsychologicalImpacted)
  ) %>%
  mutate(
    SchoolingAffected = recode(SchoolingAffected, "1" = "Extremely affected", "2" = "Mod
erately Affected", "3" = "Somewhat Affected", "4" = "Not Affected"),
    SchoolingAffected = as.factor(SchoolingAffected)
  ) %>%
  mutate(
    LocalLangReadingLevel = recode(LocalLangReadingLevel, "1" = "Beginner/Nothing", "2"
= "Letters", "3" = "Words", "4" = "Sentences", "5" = "Story"),
    LocalLangReadingLevel = as.factor(LocalLangReadingLevel)
  ) %>%
  mutate(
    ArithmeticLevel = recode(ArithmeticLevel, "1" = "Beginner/Nothing", "2" = "Numbers 1
-9", "3" = "Number 10-99", "4" = "Numbers 100-200", "5" = "Subtraction 2-Digits", "6" =
"Subtraction 4-Digits", "7" = "Division"),
    ArithmeticLevel = as.factor(ArithmeticLevel)
  ) %>%
  mutate(
    EnglishReadingLevel = recode(EnglishReadingLevel, "1" = "Beginner/Nothing", "2" = "C
apital Letters", "3" = "Small Letters", "4" = "Words", "5" = "Sentences"),
    EnglishReadingLevel = as.factor(EnglishReadingLevel)
  ) %>%
  mutate(
    HouseType = recode(HouseType, "1" = "Kutcha", "2" = "Semi-Pucca", "3" = "Pucca"),
    HouseType = as.factor(HouseType)
  )
```

```
## Warning: There was 1 warning in `mutate()`.
## i In argument: `SchoolType = recode(SchoolType, `1` = "Government", `2` =
##   "Private")`.
## Caused by warning:
## ! Unreplaced values treated as NA as `.x` is not compatible.
## Please specify replacements exhaustively or supply `.default`.
```

```
## Warning: There was 1 warning in `mutate()`.
## i In argument: `SingleOrCoEdSchool = recode(...)`.
## Caused by warning:
## ! Unreplaced values treated as NA as `.x` is not compatible.
## Please specify replacements exhaustively or supply `.default`.
```

```
## Warning: There was 1 warning in `mutate()`.
## ℹ In argument: `InstructionMedium = recode(...)`.
## Caused by warning:
## ! Unreplaced values treated as NA as `.x` is not compatible.
## Please specify replacements exhaustively or supply `.default`.
```

5. Data Visualization

5.1 Bar Graph for School Type

```
# --- Bar Graph for School Type ---
child_house_school_filtered %>%
  ggplot(aes(x = SchoolType, fill = "ChildrenEnrolled")) +
  geom_bar(fill = "lightpink", color = "black") +
  labs(title = "School Type Distribution by Number of Children Enrolled",
       x = "School Type",
       y = "Number of Children Enrolled and Surveyed") +
  coord_flip() +  # Flips the x and y axes
  theme_modern()
```

School Type Distribution by Number of Children Enrolled
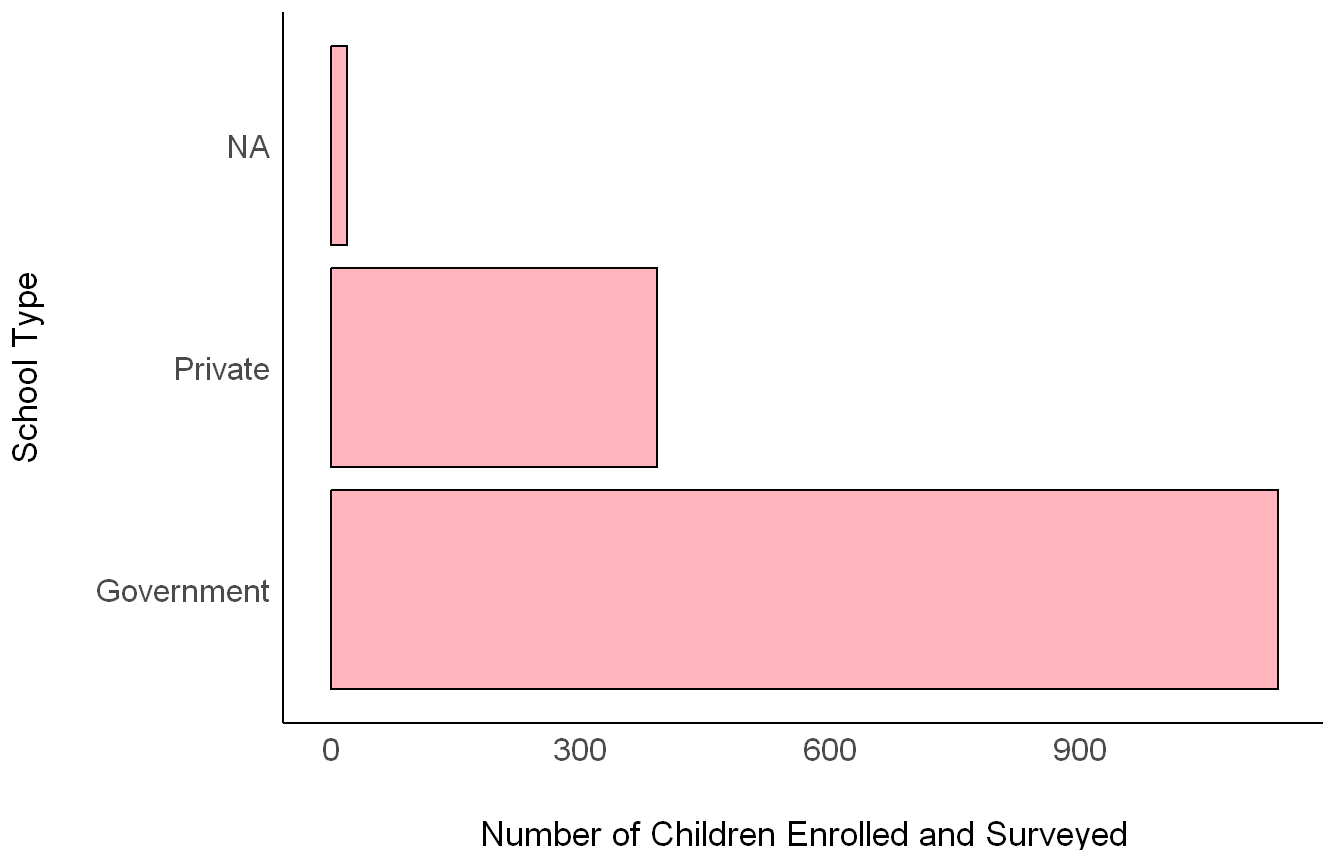
5.2 Scatter Plot for Children Enrolled vs. Children Present by

School Type in Each Rural Region

```r
# --- Children Enrolled vs. Children Present by SchoolType in Each Rural Region ---

children_by_school <- child_house_school_filtered %>% #Creating a new variable to manipulate the data easily without affecting the original dataset
  select(RNAME, SchoolType, ChildrenEnrolled, ChildrenPresent) %>%
  filter(ChildrenEnrolled < 900, ChildrenPresent < 900) %>%  # Filter out high values
  filter(!is.na(SchoolType))  # Filter out missing values

children_by_school %>%
  ggplot(aes(x = ChildrenEnrolled, y = ChildrenPresent)) +
  geom_point(aes(color = SchoolType), alpha = 0.5) +
  geom_smooth(method = "lm") + # Adds a linear regression line
  facet_wrap(~ RNAME) +
  scale_x_log10() + # Using log scale for x-axis to allow for wide range of values to be distributed effectively
  scale_y_log10() + # Using log scale for y-axis to allow for wide range of values to be distributed effectively
  labs(title = "Children Enrolled vs. Children Present by SchoolType in Each Rural Region",
       x = "Children Enrolled",
       y = "Children Present at the time of survey") +
  theme_modern()
```

```
## `geom_smooth()` using formula = 'y ~ x'
```

Children Enrolled vs. Children Present by SchoolType in Each Rural Region
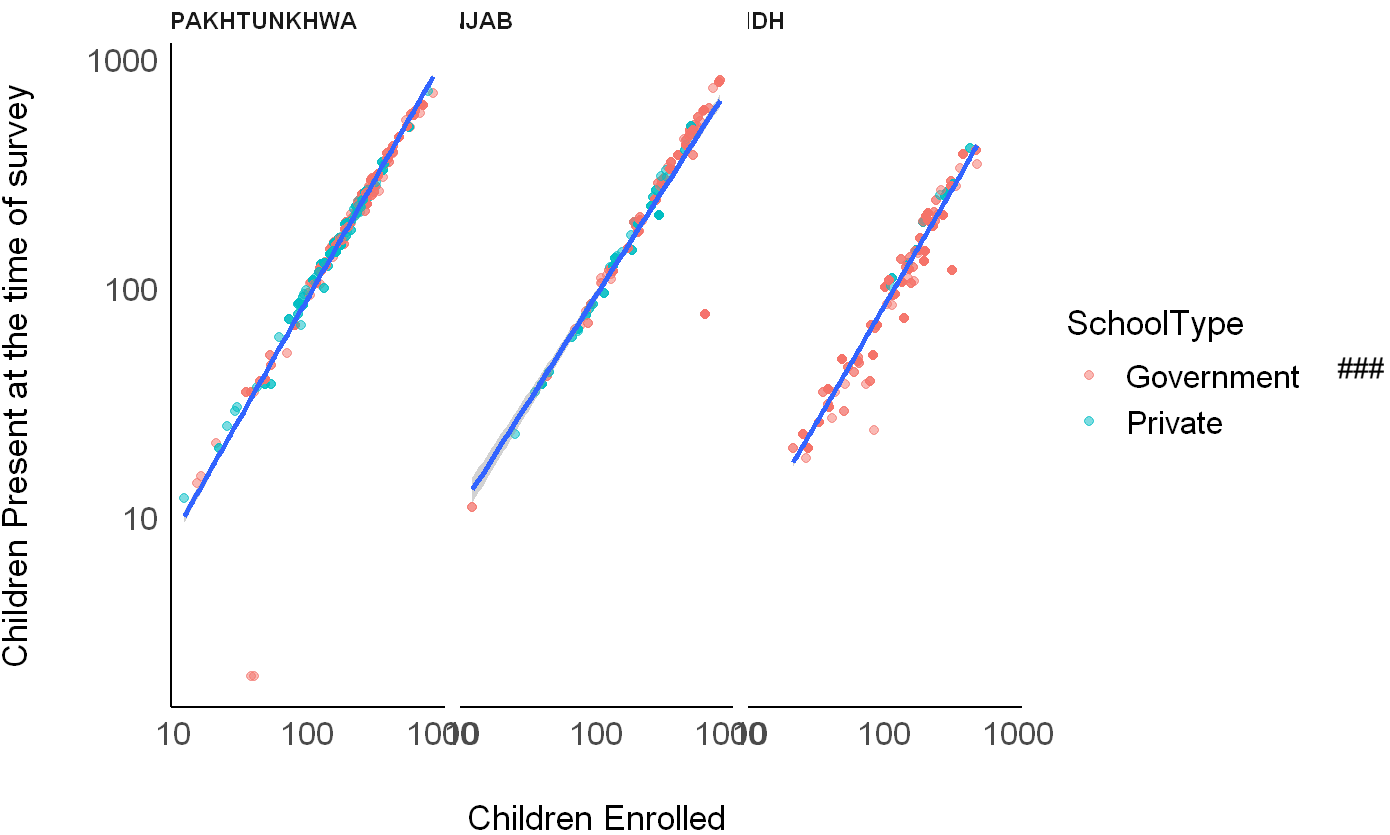
5.3 Bar Graph for Students Enrolled in Co-Ed vs Single-Gender Schools

```
ggplot(child_house_school_filtered, aes(x = SingleOrCoEdSchool)) +
  geom_bar(fill = "lightblue") +
  labs(title = "Number of Students Enrolled in Co-Ed vs Single-Gender Schools", x = "Sch
ool Type", y = "Count") +
  theme_modern()
```

Number of Students Enrolled in Co-Ed vs Single-Gender Schools
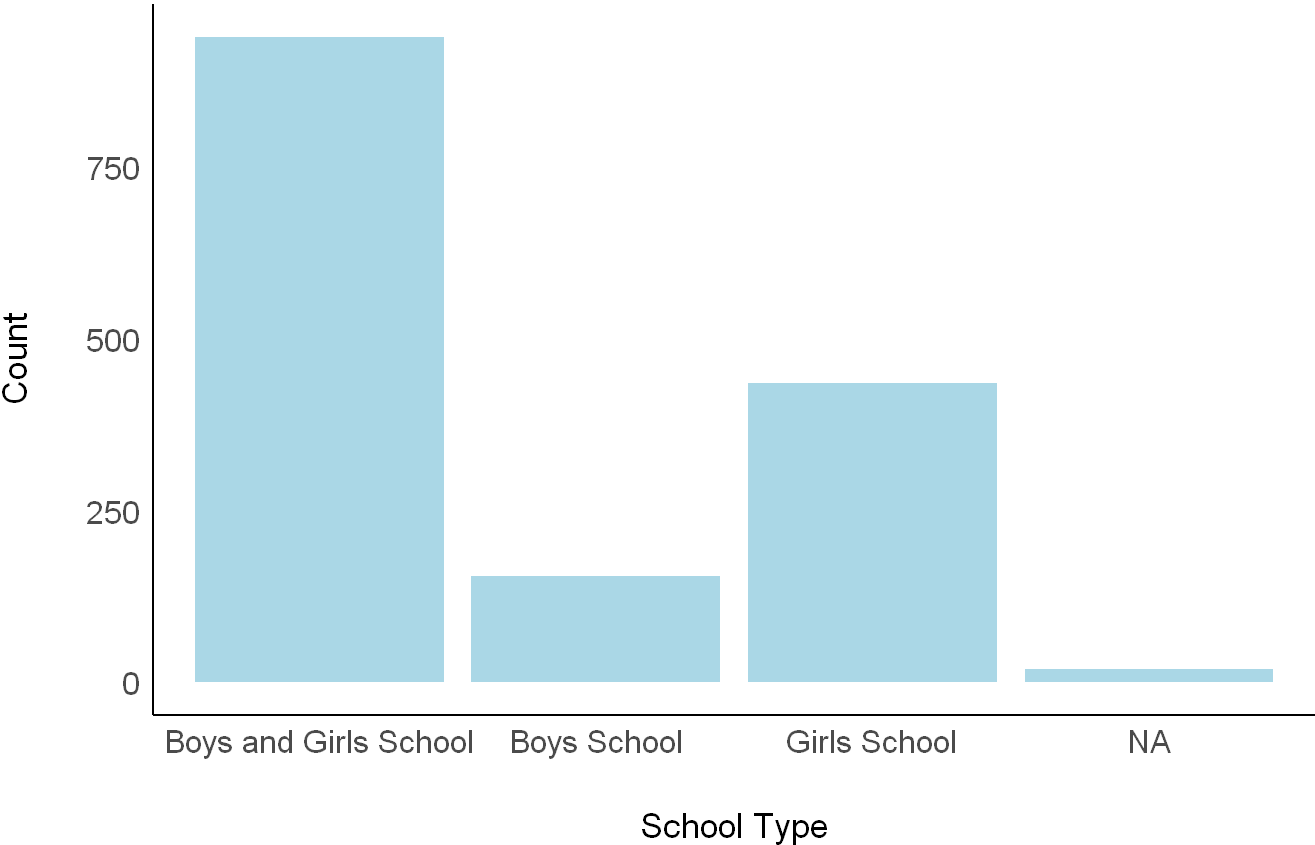
5.4 Bar Graph Showing the Proportion of Psychological Impact by Level of Flood Impact

```
ggplot(child_house_school_filtered, aes(x = FloodImpacted, fill = PsychologicalImpacte
d)) +
  geom_bar(position = "fill") +  # Creates a stacked bar chart
  coord_flip() +  # Flips the x and y axes
  labs(title = "Proportion of Psychological Impact by Flood Impact", x = "Flood Impact",
y = "Proportion") +
  theme_modern()
```

Proportion of Psychological Impact by Flood Impact
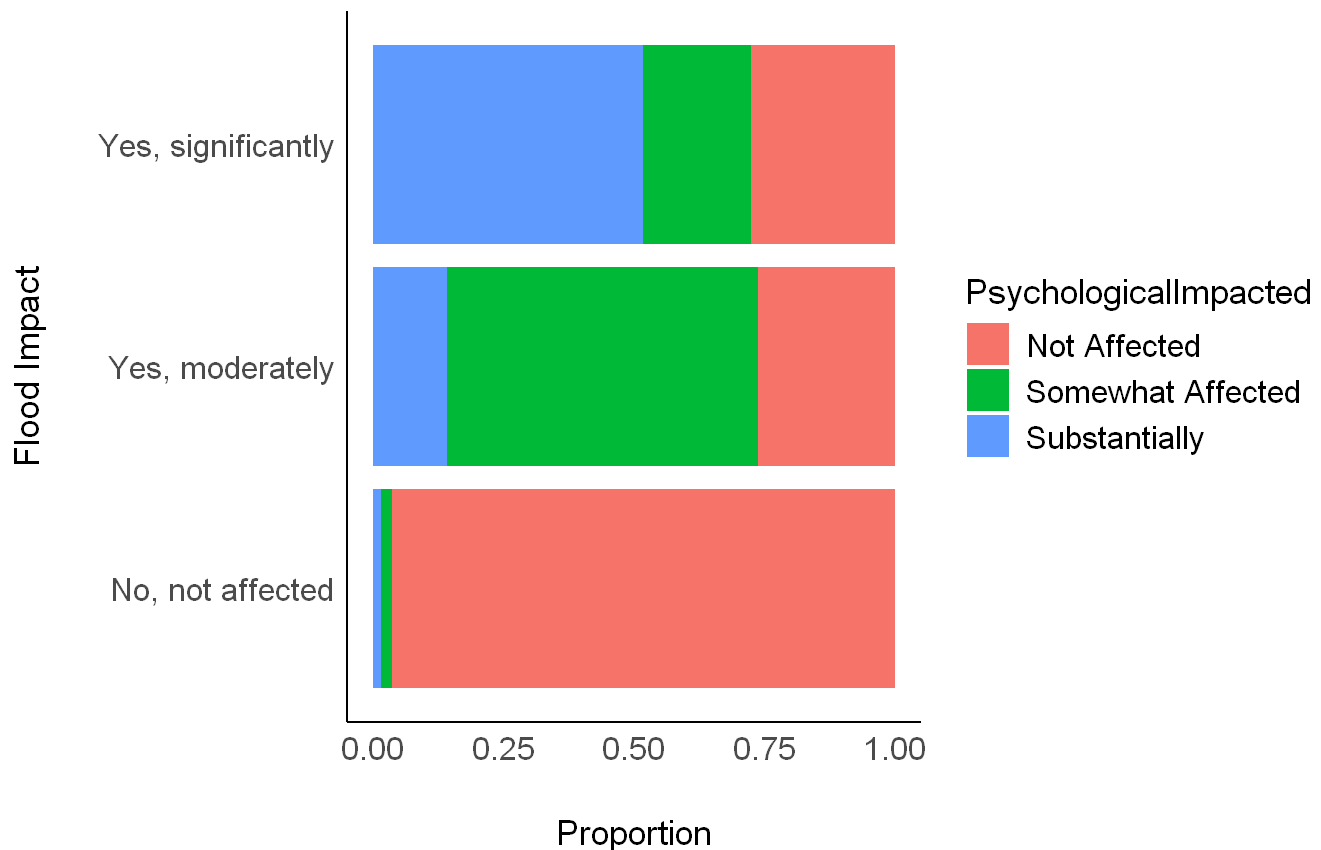
5.5 Bar Graph Showing the Proportion of Earning Impacted by Levels of Climate Change Awareness

```
ggplot(child_house_school_filtered, aes(x = ClimateChange, fill = EarningImpacted)) +
  geom_bar(color = "black", position = "fill") +  # Creates a stacked bar chart
  coord_flip() +  # Flips the x and y axes
  labs(title = "Proportion of Earning Impact by Climate Change Awareness", x = "Climate
Change Awareness", y = "Proportion") +
  theme_modern()
```

Proportion of Earning Impact by Climate Change Awareness
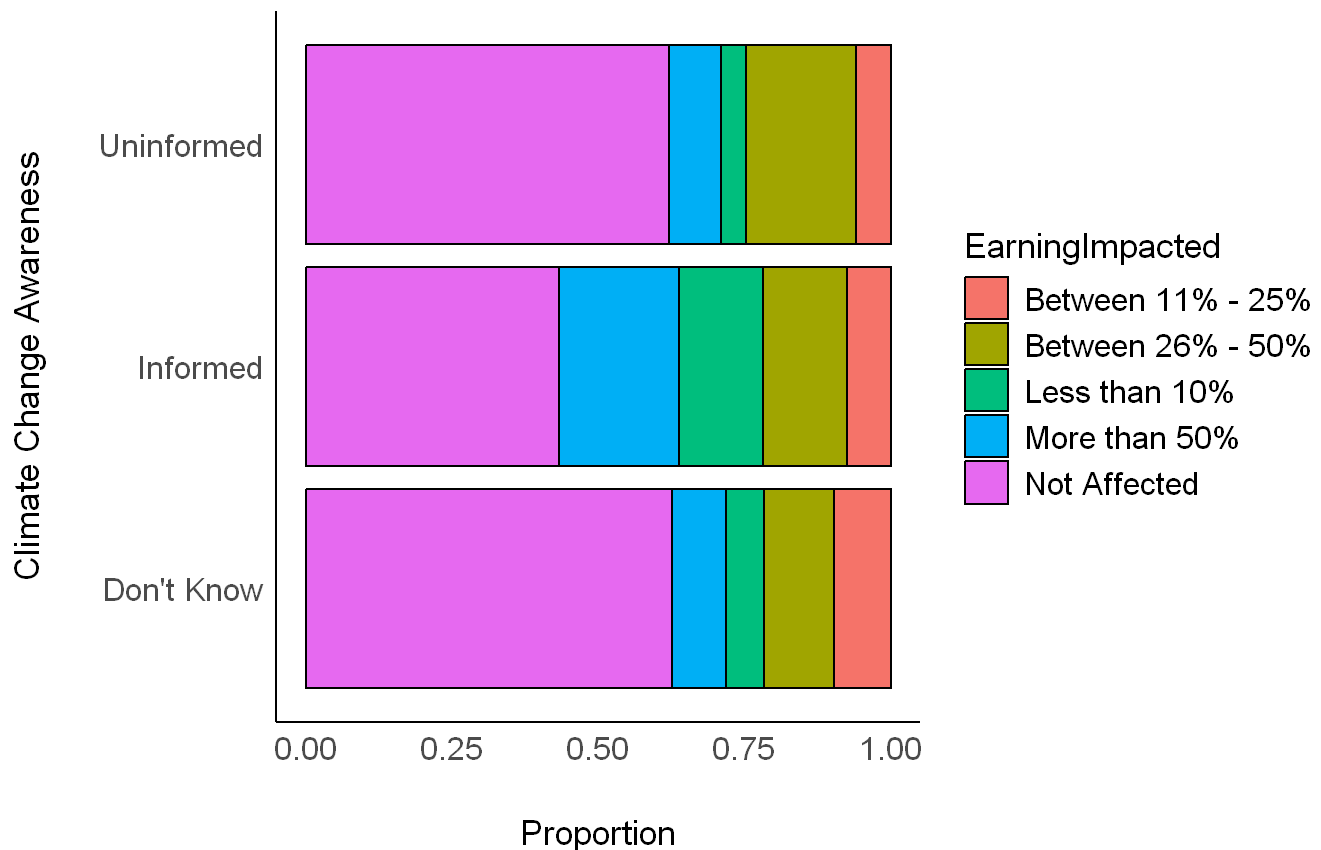
5.6 Distribution of Arithmetic Levels by Medium of Instruction for the Primary Grades

```
# Distribution of Arithmetic Levels by Medium of Instruction for the Primary Grades
grade_arithmetic_medium <- child_house_school_filtered %>%
  select(InstructionMedium, ArithmeticLevel, Grades) %>%
  filter(Grades %in% c("Grade 1", "Grade 2", "Grade 3", "Grade 4", "Grade 5")) %>%  # Fi
lter out only the first five grades to focus on primary levels
  filter(InstructionMedium != "Others")  # Filter out the "Others" category
ggplot(grade_arithmetic_medium, aes(x = InstructionMedium, fill = ArithmeticLevel)) +
  geom_bar(color = "black", position = "fill") +  # Stacks the bars proportionally
  facet_wrap(~ Grades) +  # Facets the plot by Grades
  labs(title = "Distribution of Arithmetic Levels by Medium of Instruction for Primary G
rades",
       x = "Medium of Instruction (English, Sindhi, Urdu)",
       y = "Proportion of Students Reaching the Arithmetic Level") +
  theme_modern()
```

Distribution of Arithmetic Levels by Medium of Instruction for Primary Grades

Proportion of Students Reaching the Arithmetic Level (y-axis)

Medium of Instruction (English, Sindhi, Urdu)

Grade 1, Grade 2, Grade 3, Grade 4, Grade 5

ArithmeticLevel
- Beginner/Nothing
- Division
- Number 10-99
- Numbers 1-9
- Numbers 100-200
- Subtraction 2-Digits
- Subtraction 4-Digits
- NA
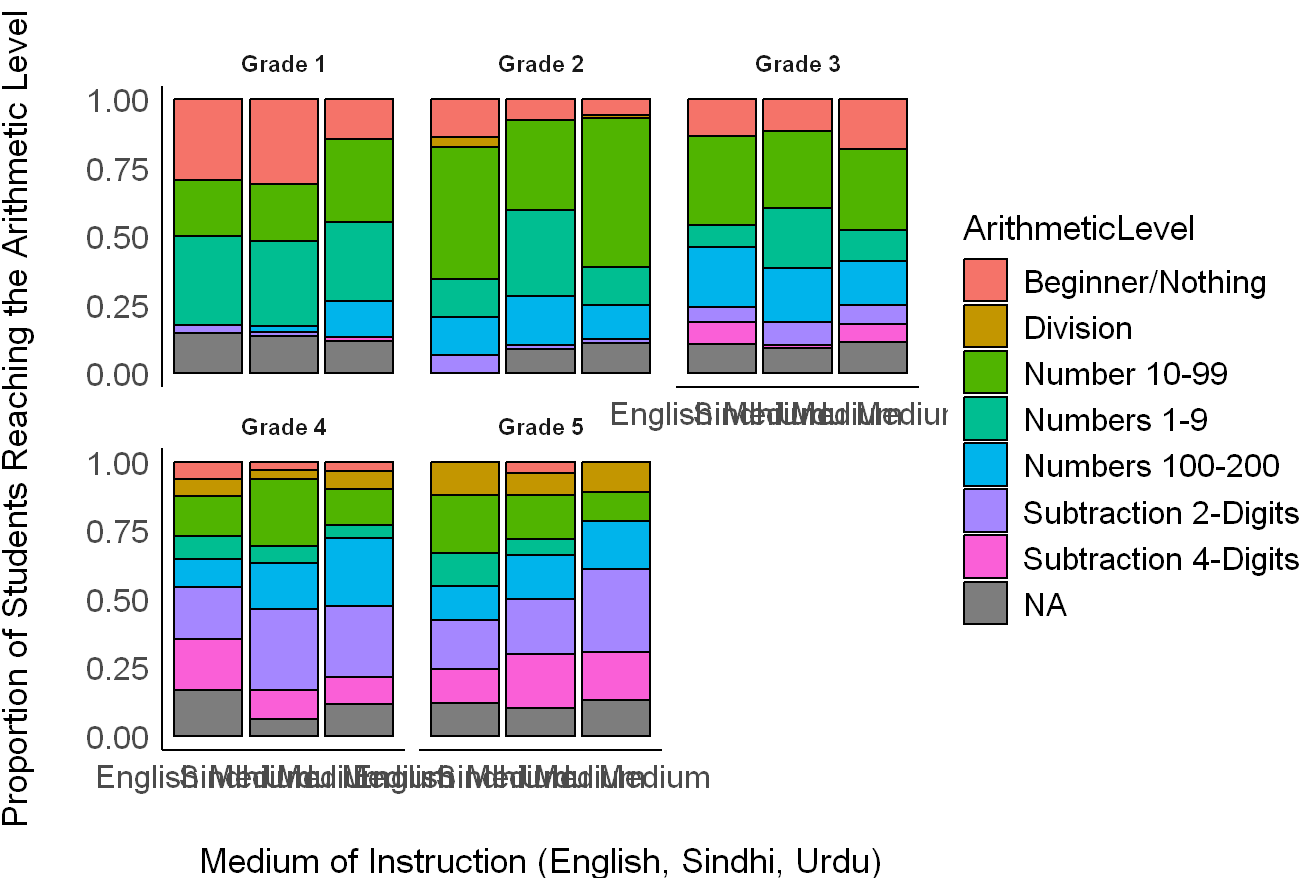
6. Discussion

The bar graph for school type distribution shows that the majority of children are enrolled in government schools compared to private schools. Since the observations are concentrated in rural areas instead of urban, this distribution tends well to the hypothesis that the majority students in rural areas access education through government (public) schools.

The scatter plot for children enrolled vs. children present by school type in each rural region shows that there is a positive correlation between the number of children enrolled and the number of children present in both government and private schools. The linear regression line indicates that as the number of children enrolled increases, the number of children present also increases. This suggests that the schools are able to maintain a good attendance rate for the children enrolled. This is remarkable as it shows that the schools have been resilient in dealing with the after effects of the 2022 floods in Pakistan which resulted in significant impact on the infrastructure of schools, and schooling outcomes of children.

The stacked bar graphs for understanding the relationship between the climate change awareness and the proportion of households experiencing an earning impact, and the flood impact and the proportion of psychological impact, show that there is a significant proportion of households experiencing an earning impact due to climate change. This is a concerning finding as it suggests that the awareness of climate change is not translating into effective policy measures to mitigate the impact on the earning capacity of households. Similarly, the proportion of psychological impact due to flood impact is also significant, which indicates that the psychological well-being of individuals is being affected by the natural disasters in the region.

The distribution of arithmetic levels by the medium of instruction for the primary grades shows that the majority of students are able to reach the arithmetic level of numbers 1-9 in the first five grades. This is a positive finding as it suggests that the students are able to grasp the basic arithmetic concepts in the early grades. However, there is a need to focus on improving the arithmetic levels for the higher grades to ensure that the students are able to build on their foundational knowledge and skills.The performance of schools based on the medium of instruction is also a significant finding as it shows that the students are able to perform comparatively similar in arithmetic for all three major mediums. This goes against the common perception that students perform better in English medium schools compared to Urdu and Sindhi medium schools. However, more research is needed to understand the factors that contribute to the performance of students in different mediums of instruction.