KB Penta+Measles

PENTA/Measles in India

NOTE, SCHEDULE FOR PENTA is 6w, 10w, 14w, First dose of Measles is given at 9m (or is supposed to be). Looking at the age distribution for Measles dose at 9m, it seems to be given mostly between 9 and 12m. also if restrict analyses to birth cohorts born after March 2018, coverage is lower than if include earlier years as well.

Coverage of 4th dose in 12-24m olds seems to have trailed off in last few months. Is this a reporting delay or something? This problem is unique to the Measles dose (9m) and is not seen in the primary doses.

Define variables

```
##                       PENTA1
## routine.eligible.flag     0     1
##                     1   202 14224
```

```
## [1] "Number of kids with 1,2,3 doses Penta, or first Measles"
```

```
## [1] 14224
```

```
## [1] 12635
```

```
## [1] 11355
```

```
## [1] 9299
```

Uptake of 1,2,3 doses of Penta, 1 dose Measles, by birth month

```
## [1] "Number of eligible kids registered in KB system who did not or did receive first dose of PENTA,
```

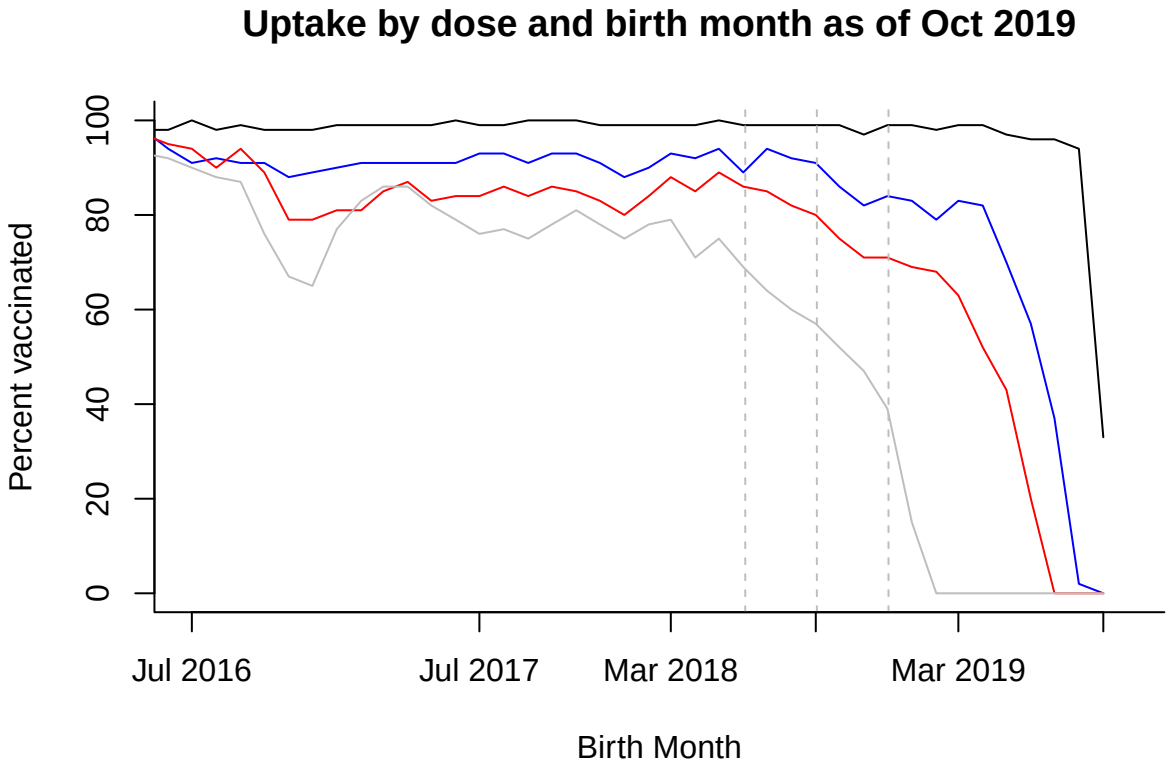
```
##             PENTA1
## dob_month      0   1
##   2006-01-01   0   1
##   2013-05-01   0   1
##   2014-01-01   1   0
##   2014-04-01   0   1
##   2014-06-01   0   1
##   2014-08-01   0   1
##   2014-10-01   1   2
##   2014-12-01   0   1
##   2015-01-01   0   2
##   2015-02-01   0   1
##   2015-03-01   0   5
##   2015-04-01   0   1
##   2015-05-01   0   1
##   2015-06-01   0   4
##   2015-07-01   0  10
##   2015-08-01   0  20
##   2015-09-01   1  30
##   2015-10-01   2  47
##   2015-11-01   1  59
```

```
##   2015-12-01   0  65
##   2016-01-01   1  80
##   2016-02-01   3  69
##   2016-03-01   4  85
##   2016-04-01   2 111
##   2016-05-01   3 177
##   2016-06-01   4 218
##   2016-07-01   1 251
##   2016-08-01   5 251
##   2016-09-01   3 233
##   2016-10-01   8 336
##   2016-11-01   9 383
##   2016-12-01  10 407
##   2017-01-01   4 439
##   2017-02-01   4 363
##   2017-03-01   3 375
##   2017-04-01   3 302
##   2017-05-01   3 384
##   2017-06-01   2 411
##   2017-07-01   4 441
##   2017-08-01   4 440
##   2017-09-01   2 413
##   2017-10-01   1 495
##   2017-11-01   0 477
##   2017-12-01   3 434
##   2018-01-01   5 440
##   2018-02-01   3 378
##   2018-03-01   4 340
##   2018-04-01   5 340
##   2018-05-01   1 298
##   2018-06-01   3 318
##   2018-07-01   3 429
##   2018-08-01   6 397
##   2018-09-01   4 390
##   2018-10-01   4 390
##   2018-11-01  15 434
##   2018-12-01   2 313
##   2019-01-01   3 347
##   2019-02-01   6 287
##   2019-03-01   2 276
##   2019-04-01   3 243
##   2019-05-01   6 228
##   2019-06-01   8 213
##   2019-07-01   8 188
##   2019-08-01   9 141
##   2019-09-01  10   5

## [1] "Proportion of all eligible kids registered in KB system who did not or did receive first dose o

##             PENTA1
## dob_month       0    1
##   2006-01-01 0.00 1.00
##   2013-05-01 0.00 1.00
##   2014-01-01 1.00 0.00
##   2014-04-01 0.00 1.00
```

```
##   2014-06-01 0.00 1.00
##   2014-08-01 0.00 1.00
##   2014-10-01 0.33 0.67
##   2014-12-01 0.00 1.00
##   2015-01-01 0.00 1.00
##   2015-02-01 0.00 1.00
##   2015-03-01 0.00 1.00
##   2015-04-01 0.00 1.00
##   2015-05-01 0.00 1.00
##   2015-06-01 0.00 1.00
##   2015-07-01 0.00 1.00
##   2015-08-01 0.00 1.00
##   2015-09-01 0.03 0.97
##   2015-10-01 0.04 0.96
##   2015-11-01 0.02 0.98
##   2015-12-01 0.00 1.00
##   2016-01-01 0.01 0.99
##   2016-02-01 0.04 0.96
##   2016-03-01 0.04 0.96
##   2016-04-01 0.02 0.98
##   2016-05-01 0.02 0.98
##   2016-06-01 0.02 0.98
##   2016-07-01 0.00 1.00
##   2016-08-01 0.02 0.98
##   2016-09-01 0.01 0.99
##   2016-10-01 0.02 0.98
##   2016-11-01 0.02 0.98
##   2016-12-01 0.02 0.98
##   2017-01-01 0.01 0.99
##   2017-02-01 0.01 0.99
##   2017-03-01 0.01 0.99
##   2017-04-01 0.01 0.99
##   2017-05-01 0.01 0.99
##   2017-06-01 0.00 1.00
##   2017-07-01 0.01 0.99
##   2017-08-01 0.01 0.99
##   2017-09-01 0.00 1.00
##   2017-10-01 0.00 1.00
##   2017-11-01 0.00 1.00
##   2017-12-01 0.01 0.99
##   2018-01-01 0.01 0.99
##   2018-02-01 0.01 0.99
##   2018-03-01 0.01 0.99
##   2018-04-01 0.01 0.99
##   2018-05-01 0.00 1.00
##   2018-06-01 0.01 0.99
##   2018-07-01 0.01 0.99
##   2018-08-01 0.01 0.99
##   2018-09-01 0.01 0.99
##   2018-10-01 0.01 0.99
##   2018-11-01 0.03 0.97
##   2018-12-01 0.01 0.99
##   2019-01-01 0.01 0.99
##   2019-02-01 0.02 0.98
```

```
##   2019-03-01 0.01 0.99
##   2019-04-01 0.01 0.99
##   2019-05-01 0.03 0.97
##   2019-06-01 0.04 0.96
##   2019-07-01 0.04 0.96
##   2019-08-01 0.06 0.94
##   2019-09-01 0.67 0.33
```

```
## Warning in int_abline(a = a, b = b, h = h, v = v, untf = untf, ...):
## graphical parameter "type" is obsolete
```



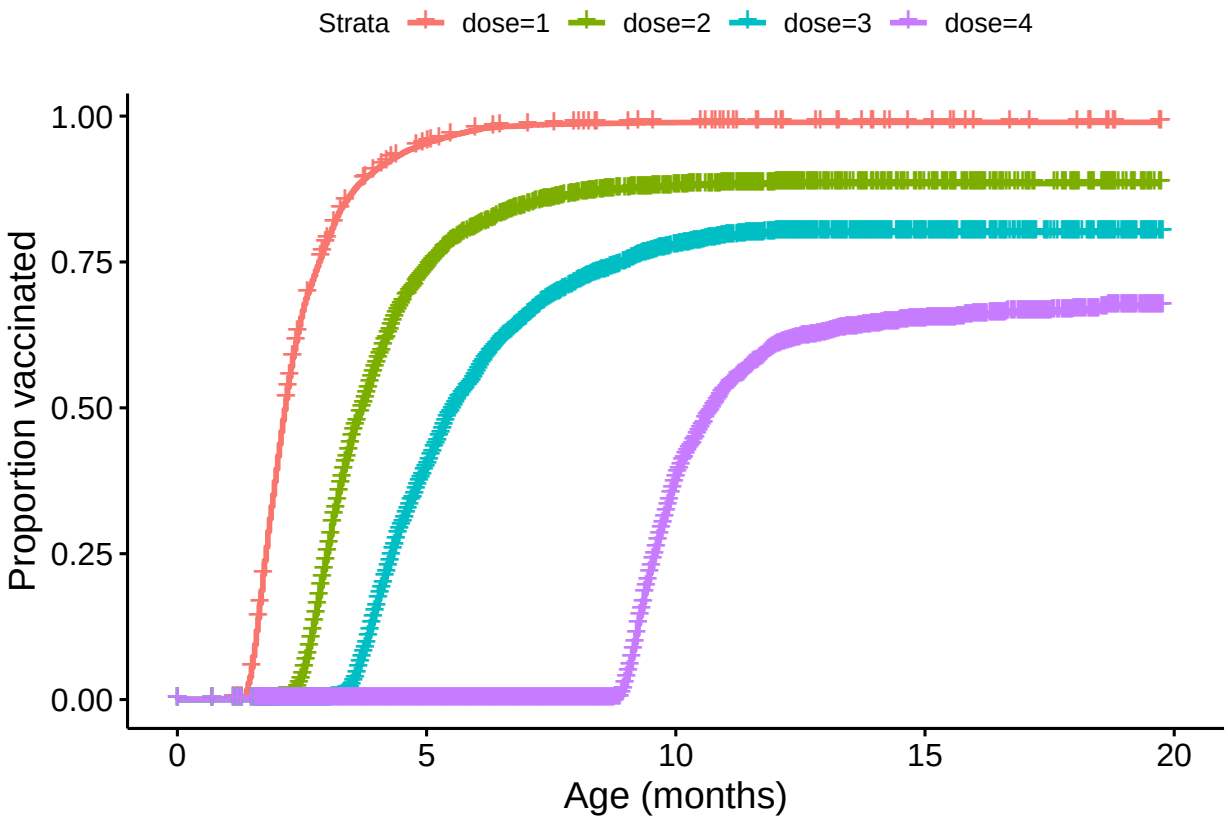
What is rate of refusal?

```
##
##            Administered in other facility Avoid wastage Child sick Given
##   2015    0                             0             0          0     2
##   2016    0                             0             0          0   346
##   2017    2                             0             5          0  2563
##   2018    0                             0             6          2  3997
##   2019    0                             1            25          5  2391
##
##        Mother denies mr me lg gya h 7/8/2019 Multiple injections denied
##   2015                                    0                          0
##   2016                                    0                          0
##   2017                                    0                          0
##   2018                                    6                          0                          2
##   2019                                    3                          1                          1
```

```
##
##        Not Available Not eligible Out of stock
##   2015             0            0            0
##   2016             0            0            0
##   2017             2           24            4
##   2018             7            9            0
##   2019            55           52            3
```

Look at uptake of 1,2, 3 doses by age

First look at uptake of 1,2, or booster dose by age in all kids born after March 1,2018. We restrict to this age group to match with the PCV analyses This is done as a survival model because of the structure of the data. Many kids in the database don't become age-eligible to receive a dose, so we censor them.




```
## [1] "Uptake"
```

```
##         1         2         3         4
## 0.9892707 0.8843155 0.8006616 0.6739711
```

Timeliness

Define based on within 4 weeks of recomended date https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5720480/ recommended is 1.5, 3.5 and 9 months

doses

uptake

cov.1m

cov.2m

pct.timely1m

pct.timely2m

1

1

0.99

0.67

0.87

0.67

0.88

2

2

0.88

0.45

0.67

0.51

0.76

3

3

0.8

0.3

0.49

0.37

0.62

4

4

0.67

0.38

0.53

0.56

0.79

Spatial variability in uptake

```
## [1] Gogunda  Jhadol   Salumbar Lasadia  Sarada
## Levels: Gogunda Jhadol Lasadia Salumbar Sarada
```

Table 1. Number of children in the Khushi Baby database, October 2019

Admin. Region

All Children

Children born after Mar 2018

Gogunda

3362

1419

Jhadol

3207

1483

Lasadia

900

484

Salumbar

3034

1293

Sarada

3923

1826

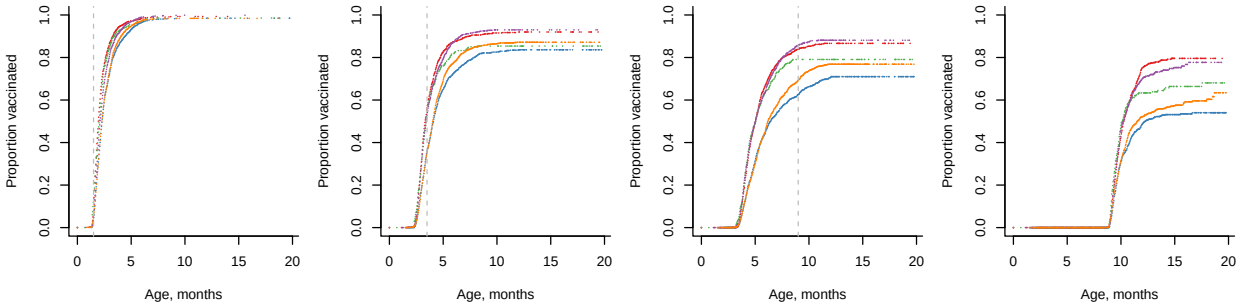
Total

14426

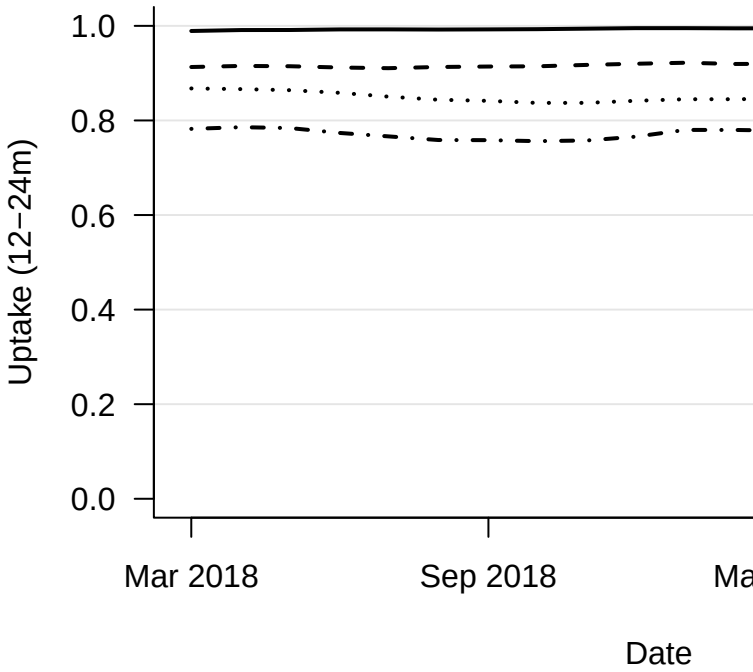
6505

```
##  1 Gogunda   1 Jhadol  1 Lasadia 1 Salumbar   1 Sarada  2 Gogunda
##  0.9929632  0.9847685  0.9855072  0.9989799  0.9839886  0.9198923
##   2 Jhadol  2 Lasadia 2 Salumbar   2 Sarada  3 Gogunda   3 Jhadol
##  0.8363185  0.8537587  0.9300505  0.8715528  0.8664574  0.7099585
##  3 Lasadia 3 Salumbar   3 Sarada  4 Gogunda   4 Jhadol  4 Lasadia
##  0.7906989  0.8811078  0.7683385  0.7957914  0.5403117  0.6805921
## 4 Salumbar   4 Sarada
##  0.7769845  0.6343044
```

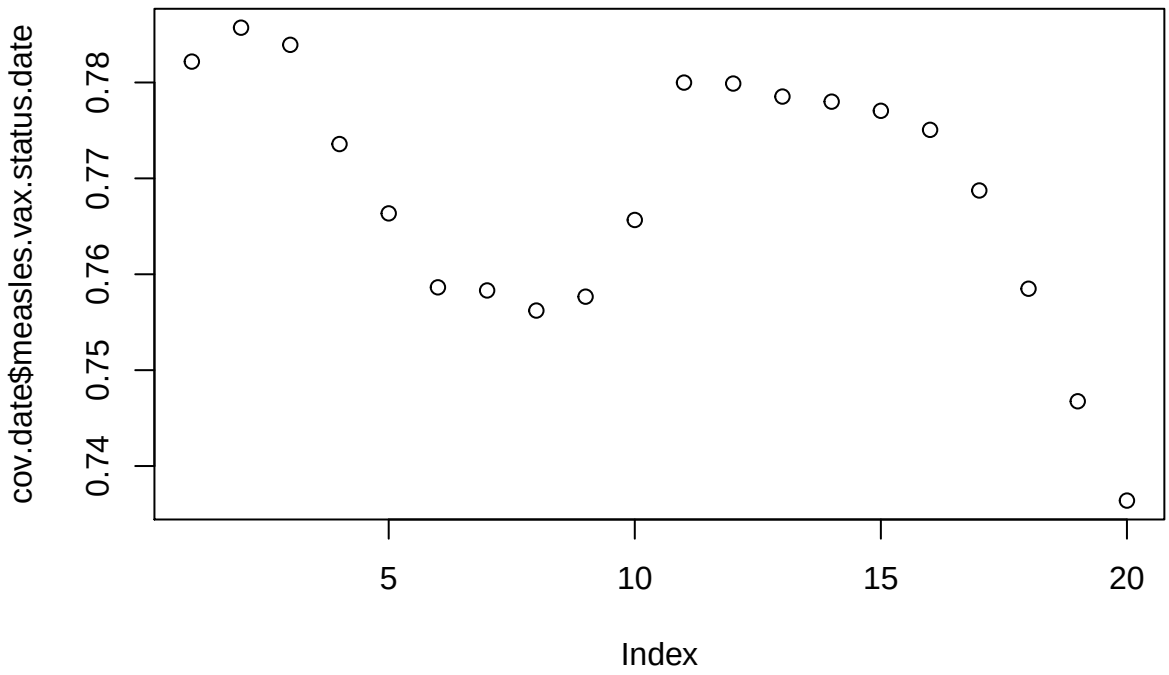
```
## Using surv as value column: use value.var to override.
```

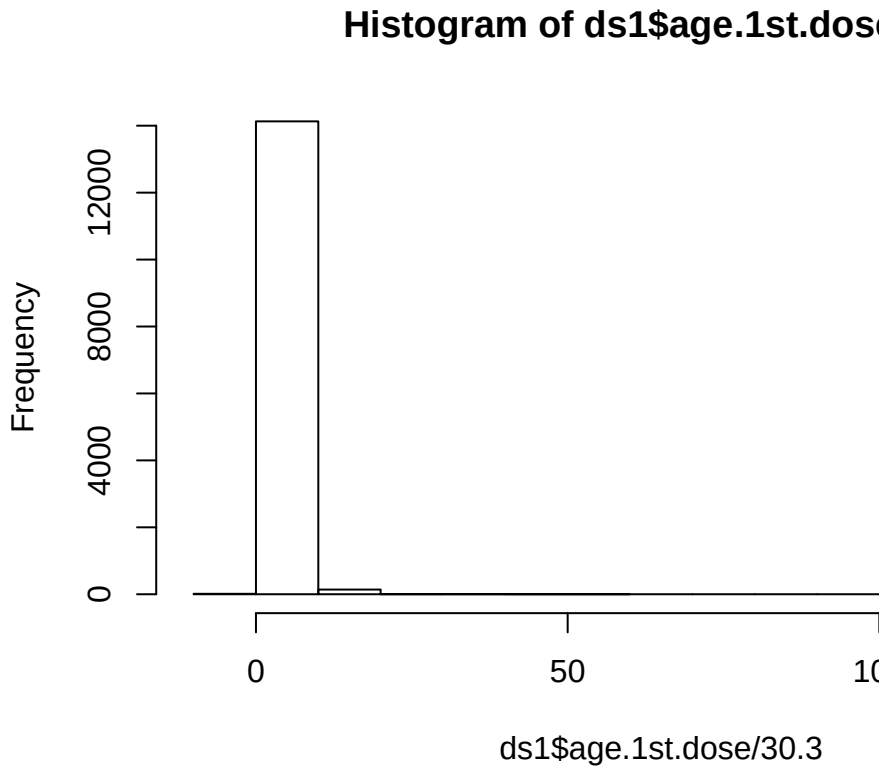

Proportion vaccinated
0.0
0.2
0.4
0.6
0.8
1.0
0
5
10
15
20
Age, months

Measles 1st dose coverage for 12-24 month old kids

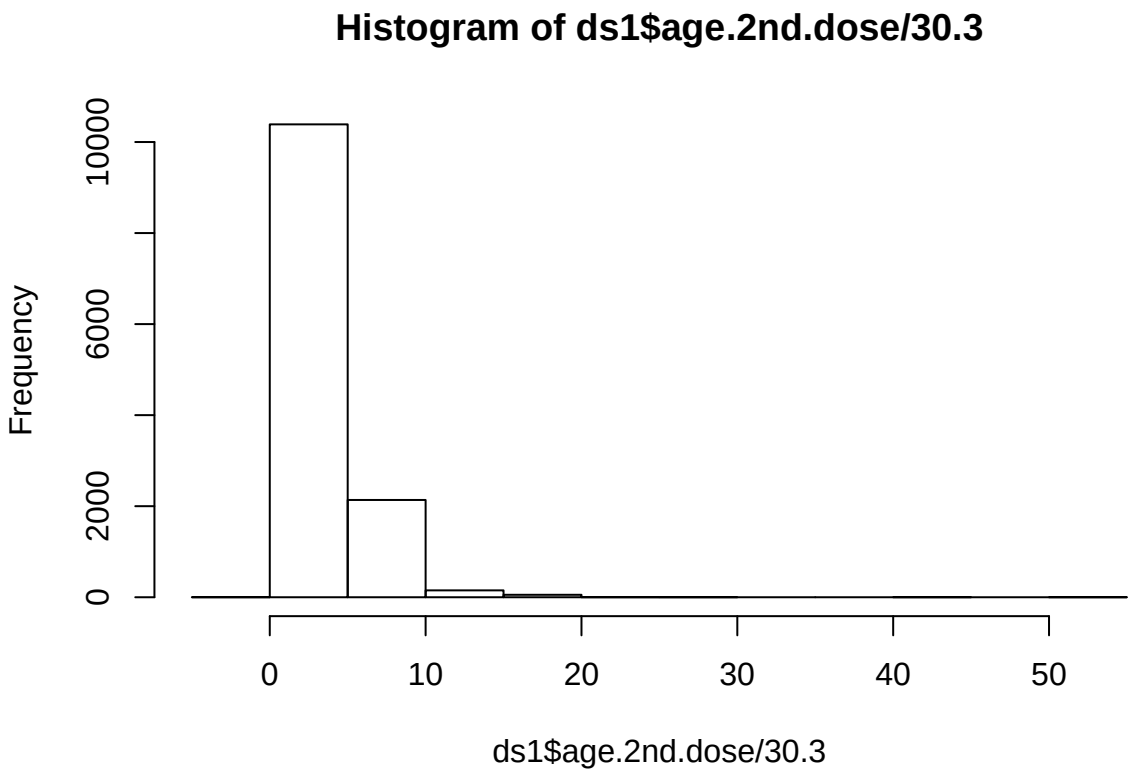


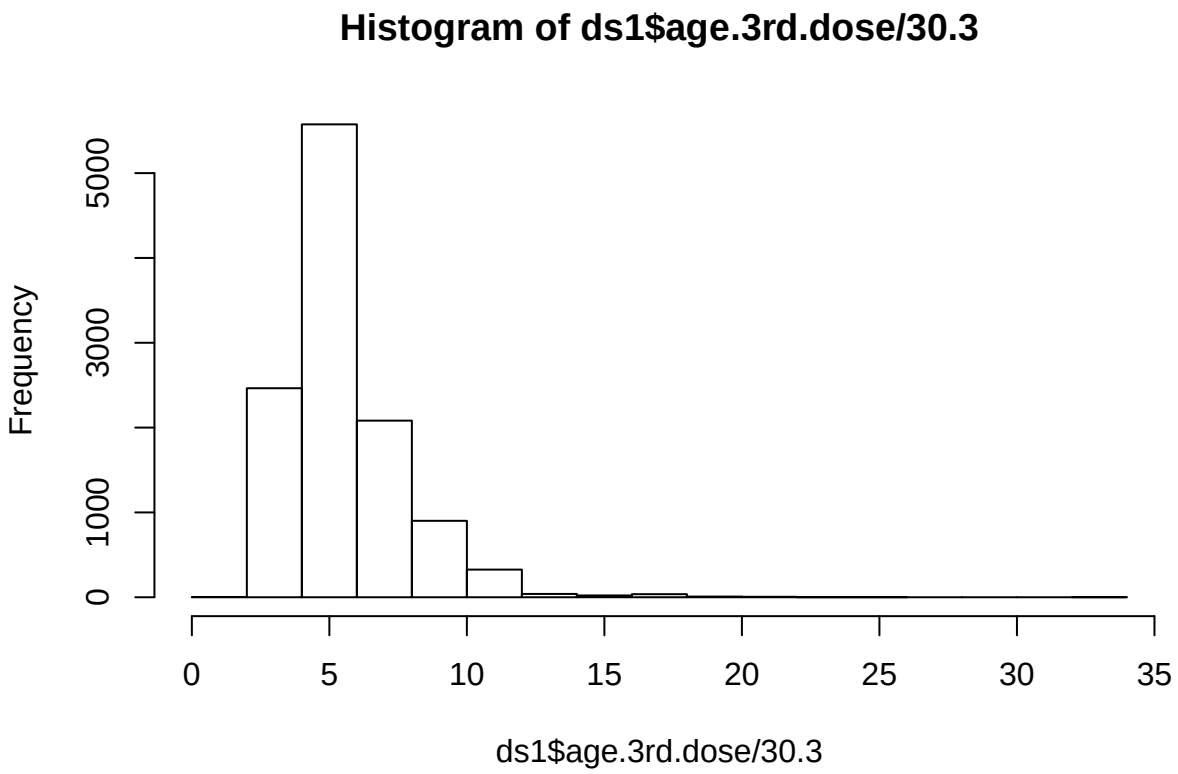
The decline is pronounced in kids 12-18m, not seen in 18-24m

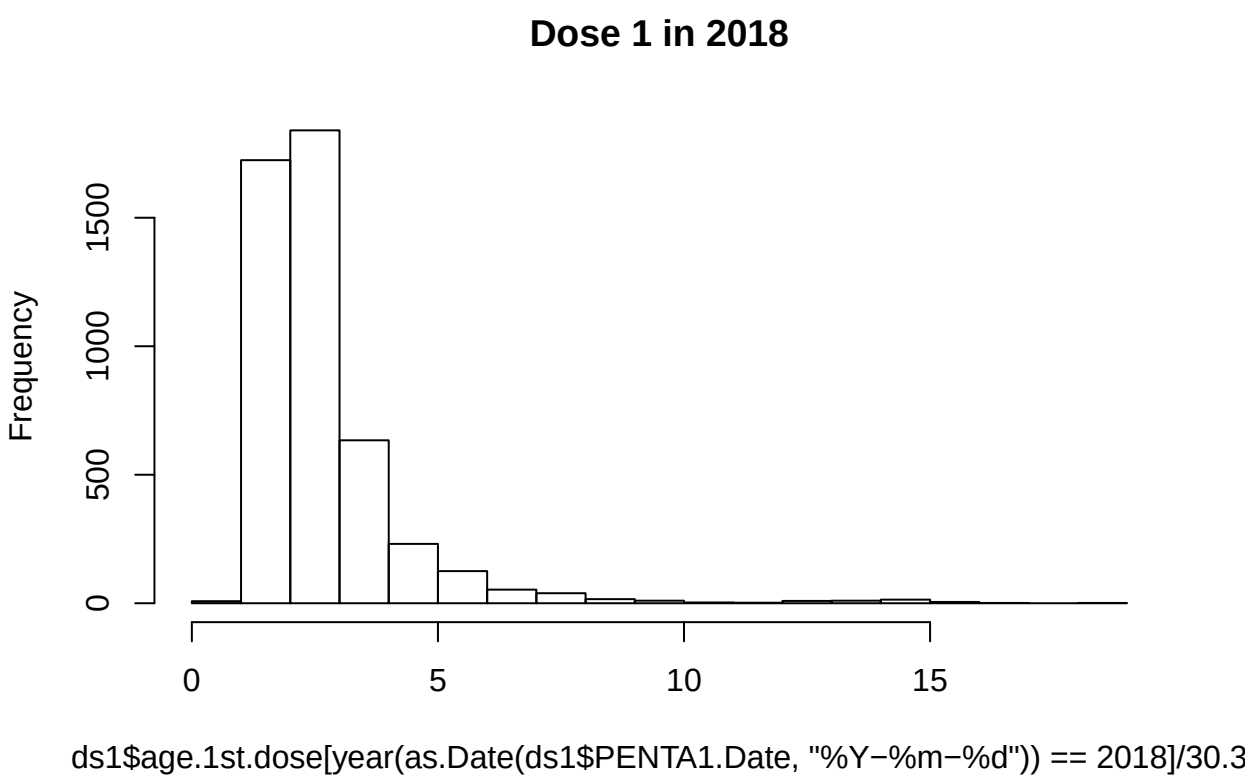


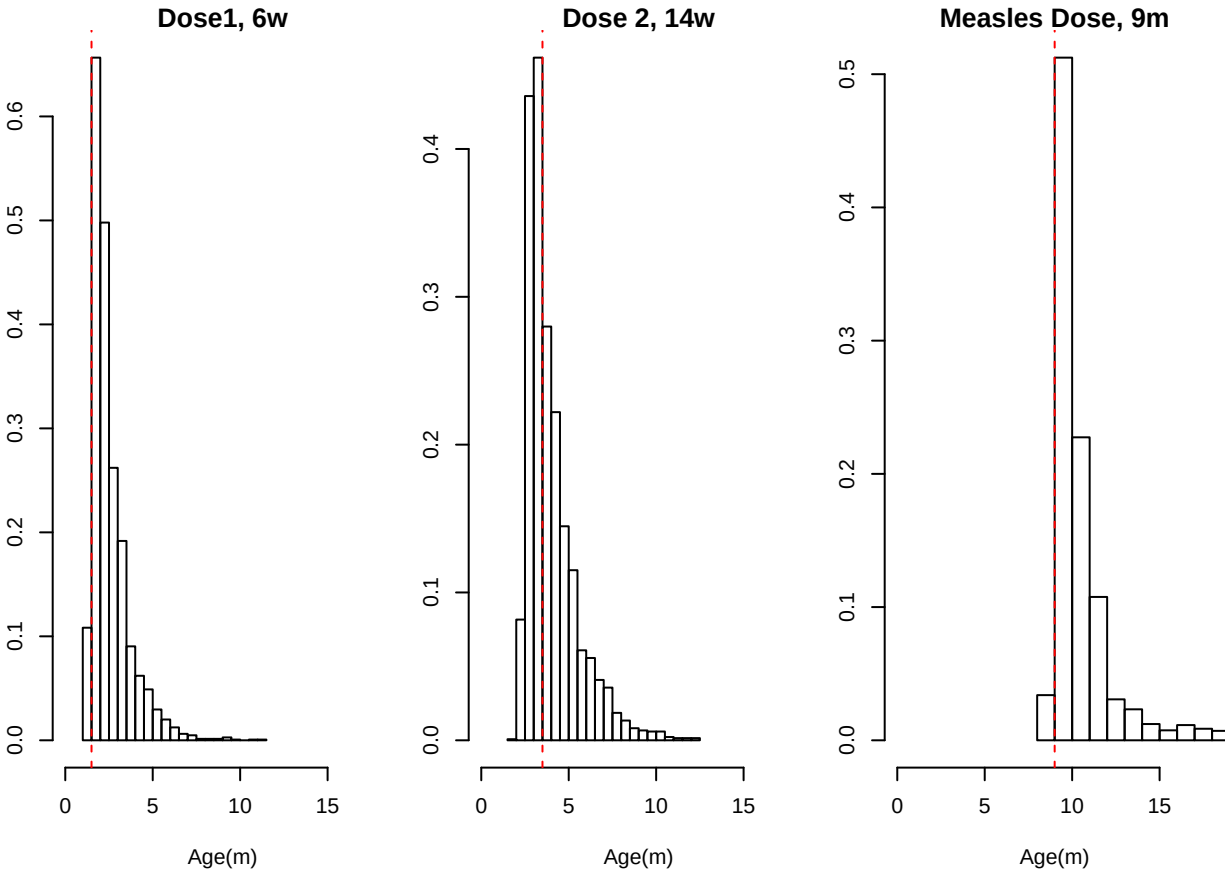


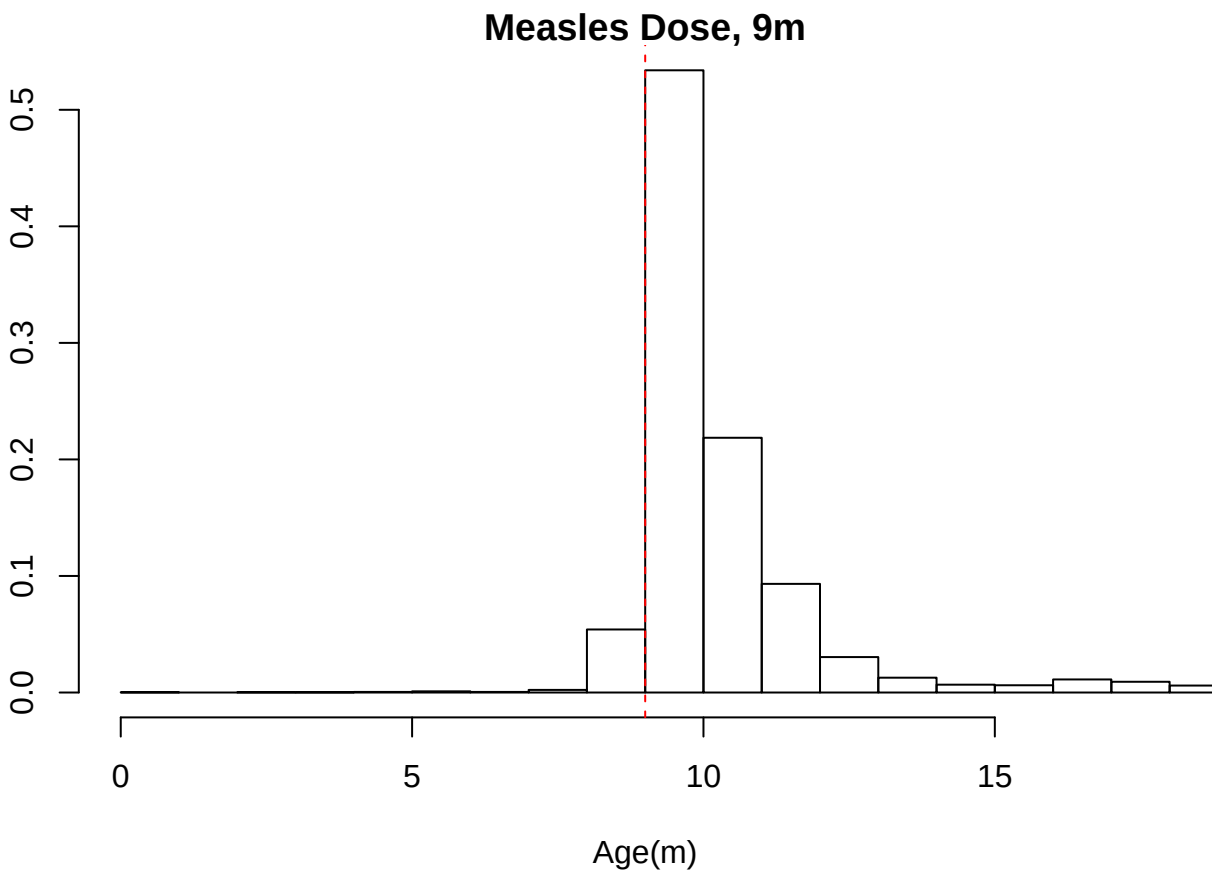
Histogram of age of kids when they are vaccinated

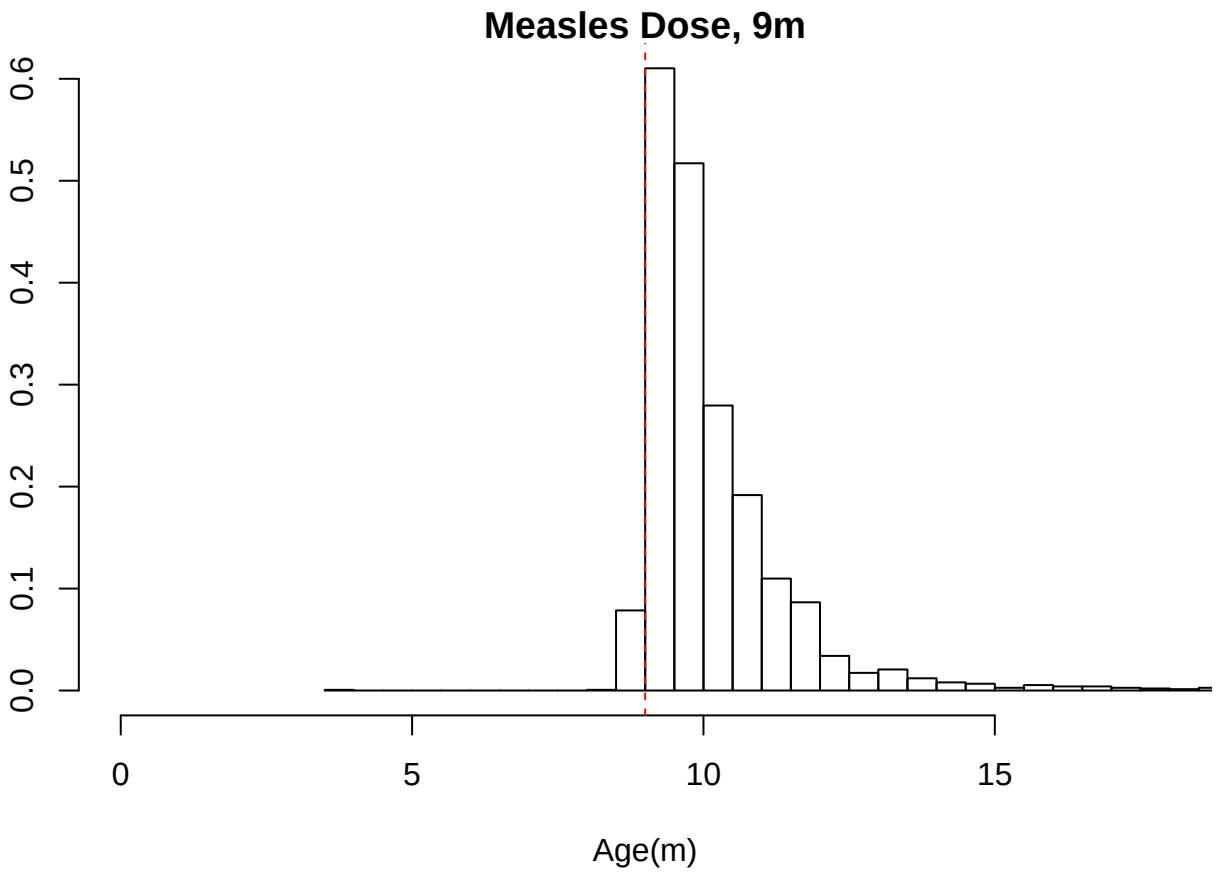

Histogram of ds1$age.2nd.dose/30.3
Frequency
0
2000
6000
10000
0
10
20
30
40
50
ds1$age.2nd.dose/30.3


Histogram of ds1$age.3rd.dose/30.3
Frequency
0
1000
3000
5000
0
5
10
15
20
25
30
35
ds1$age.3rd.dose/30.3


Dose 1 in 2018
Frequency
0
500
1000
1500
0
5
10
15
ds1$age.1st.dose[year(as.Date(ds1$PENTA1.Date, "%Y−%m−%d")) == 2018]/30.3


Dose1, 6w
Dose 2, 14w
Measles Dose, 9m
Age(m)
Age(m)
Age(m)


Measles Dose, 9m
0.0
0.1
0.2
0.3
0.4
0.5
0
5
10
15
Age(m)


Measles Dose, 9m
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0
5
10
15
Age(m)