Technical Note No. 9

Note on Vaccines and Vitamin A Variables

NOTE ON VACCINES AND VITAMIN A VARIABLES

Background:

This note explains how the vaccination coverage indicators were built and made consistent across rounds (for the same child) and also comments on the change in the questionnaire to include probe questions in round 4.

Building vaccination coverage indicators:

Vaccine and Vitamin A indicators were build based on information from the date of vaccination (section A for rounds 1,2 and 3) and probe questions (section B for round 4)[1]. We generated indicators for the following vaccines:

a) BCG,
b) each of the three doses of pentavalent combination vaccine,
c) each of the four doses of oral polio vaccine,
d) at least one dose of measles and,
e) indicator of whether or not Vitamin A supplementation was received in the last 6 months.

We also generated an indicator for children considered fully vaccinated. According to UNICEF and WHO guidelines, a child is considered fully vaccinated if he/she has received during his/her first year of life: the BCG (tuberculosis) vaccine; all three doses of pentavalent combination vaccine; three doses of oral polio vaccine (OPV); and one dose of measles vaccine.

In order to generate these indicators, we used the dates of vaccination for each of the vaccines (variable v1_b_dat for BCG, variable v2_po0_dat for polio at birth, variable v3_pent1_dat for pentavalent first dose and so on) and coded each one of them into corresponding variables with the following codes/categories:

Box.1 Codes and categories which were the basis for generating vaccines and Vitamin A supplementation indicators

Codes	Categories
1	Child vaccinated before her/his first year of life according to information on the vaccination card (section A, rounds 1 to 3); or Child received Vitamin A supplementation in the last 6 months according to information on the vaccination card (section A, rounds 1 to 3).
2	Child vaccinated after her/his first year of life according to information on the vaccination card (section A, rounds 1 to 3).
3	Inconsistency: Child vaccinated before being born according to information on the vaccination card (section A, rounds 1 to 3); or Child received Vitamin A supplementation before being born according to information on the vaccination card (section A, rounds 1 to 3).

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[1] See at the end of this note an explanation of the changes in the section of the questionnaire dedicated to vaccination information and Vitamin A supplementation.

4	Child had not been vaccinated according to information on the vaccination card (section A, rounds 1 to 3); or Child had not received Vitamin A supplementation according to information on the vaccination card (section A, rounds 1 to 3).
5	Child reported as "not vaccinated" according to the probing questions (round 4, section B); or Child reported as "not receiving Vitamin A supplementation" according to the probing questions (round 4, section B).
6	Inconsistency: Child not vaccinated according to information on the vaccination card (section A, rounds 1 to 3) but reported as vaccinated according to the probing questions (round 4, section B); or Child did not receive Vitamin A supplementation according to information on the vaccination card (section A, rounds 1 to 3) but reported as having received it according to the probing questions (round 4, section B).
7	Child reported as vaccinated according to the probing questions (round 4, section B); or Child reported as having received Vitamin A supplementation according to the probing questions (round 4, section B)
8	Child reported as vaccinated according to code 88/88/88 (section A, rounds 1 to 3); or Child reported as having received Vitamin A supplementation according to code 88/88/88 (section A, rounds 1 to 3).
9	Child vaccinated according to information on the vaccination card but date is not readable (code 99/99/99 in section A, rounds 1 to 3); or Child had received Vitamin A supplementation according to information on the vaccination card but date is not readable (code 99/99/99 in section A, rounds 1 to 3).
10	Inconsistency: Child received Vitamin A supplementation after the interview.
11	Child received Vitamin A supplementation before the last 6 months.
12	Child with missing information on vaccination or Vitamin A supplementation.

In total, we analyzed 12 indicators for children receiving vaccines any time before the survey (BCG vaccine; three doses of pentavalent combination vaccine; four doses of oral polio vaccine; three doses of pneumococcal vaccine and at least one dose of measles vaccine), 12 indicators for children receiving vaccines up to her/his first year of life (idem) and one indicator for children receiving Vitamin A supplementation in the last six months.

As a final step, all the vaccines and Vitamin A indicators generated were recoded into three codes/categories as follows:

Code 0: Child not vaccinated
Code 1: Child vaccinated – information from vaccination card
Code 2: Child vaccinated – reported information

➢ Indicators based on **receiving vaccines any time before the survey**: a) children considered as not vaccinated (code 0 above) were those classified with the codes 3, 4, 5 and 12 (showed in box 1); b) children considered as vaccinated by the vaccination card (code 1 above) were those classified with the codes 1, 2 and 9 (in Box 1); c) children reported as vaccinated (code 2 above) were those classified with the codes 6, 7 and 8 (in Box 1).

➢ Indicators based on **receiving vaccines in the first year of life**: a)children considered as not vaccinated before their first year (code 0 above) were those classified with the codes 2, 3, 4, 5, 9, 10 and 12 (showed in Box 1); b) children considered as vaccinated in their first year by the vaccination card (code 1 above) were those classified with the code 1

(in Box 1); children reported as vaccinated within one year of life (code 2 above) were those classified with the codes 6, 7 and 8 (in Box 1).

➢ Indicators for **receiving Vitamin A supplementation in the last 6 months**: a) children considered as not having received Vitamin A supplementation in the last 6 months (code 0 above) were those classified with the codes 3, 4, 5, 10, 11 and 12 (showed in Box 1); children considered as having received it by the vaccination card (code 1 above) were those classified with the codes 1 and 9 (Box 1); children reported as not having received it (code 2 above) were the ones classified with the codes 6, 7 and 8 (Box 1).

The imputation procedure to build across round consistent indicators for all vaccines and the Vitamin A indicators

It is important to bear in mind that given the longitudinal nature of the NSPMS, households were visited four times over a 12-month period. These sequential visits allowed us to improve the information on children's vaccination histories, as they increased the likelihood of having access to the vaccination cards and to find better informed interviewees on the children's vaccination histories. Some adjustments were made to the raw data in order to give consistency to the longitudinal data as per a protocol that has been proposed jointly by UNICEF Yemen, Interaction in Development and IPC.

Basically, there were inconsistencies in terms of vaccines that were reported to have been taken in a specific round and reported as "not taken" in subsequent round(s). In these cases, whenever the child was reported as vaccinated in a given moment, we considered he/she as vaccinated in the following rounds.

It is worth mentioning that the imputations were done on when building the indicators, not in the original variables on dates of vaccination or dates when the Vitamin A supplementation was received. The syntax used to generate and impute the vaccination coverage indicators is in Annex 1 at the end of this note.

Change in the way immunization and Vitamin A supplementation information were collected between rounds 1 to 3 and round 4 of the NSPMS

At the request of the Government of Yemen representatives in the NSPMS technical committee there was a change in the questionnaire on the way information on immunization and Vitamin A supplementation information were collected between the first 3 rounds of the NSPMS and its fourth round.

During the first three rounds, if the vaccination card was not shown, the enumerator was advised to ask the caregiver to recall if the child had received each of the vaccines. With this information, the enumerator would give different codes for children whom the caretaker said were vaccinated or were not vaccinated. In the fourth round, probing questions were introduced to help caretakers to recall each vaccine given to the child. Questions such as, "Has (name) ever received a BCG vaccination against tuberculosis – that is, an injection in the arm or shoulder that usually causes a scar?" or "Has (name) ever received any vaccination drops in the mouth to protect him/her from getting diseases – that is polio?", were added to the fourth round of the questionnaire. These questions increased the number of children who were reported to be vaccinated in round 4, compared to the first three rounds, which did not have any probing

questions. The oldest the child, the largest their chance to be reported as vaccinated in round four. For instance, while in the third round 27.06 per cent of children aged 48-59 months were reported as having received the essential dose of polio vaccine, in the fourth round this figure reaches 40.54 per cent.

ANNEX 1 – Syntax to generate and impute the vaccination coverage indicators (in Stata format)

```
*******************************************
* Vaccine and Vitamin A indicators
*******************************************
```

```
********* Generating the age in months at which the child was vaccinated for each of the
vaccines
```

```
********* Disaggregating days, months and years on the dates of birth
```

```
 gen birth_y_final_2 = birth_y_final if birth_y_final <= 2013
 gen birth_date_New = mdy(birth_m_final, 15, birth_y_final_2) if birth_m_final != 44 &
birth_m_final != 88 & birth_m_final != 99
```

```
********* Disaggregating days, months and years on the dates of vaccination
```

```
        local destringlist v8_va1_dat v8_va2_dat v1_b_dat v2_po0_dat v2_po1_dat
v2_po2_dat v2_po3_dat v3_pent1_dat v3_pent2_dat v3_pent3_dat v6_pn1_dat v6_pn2_dat
v6_pn3_dat

v7_m1_dat v7_m2_dat
        local i = 0
        foreach var of varlist `destringlist' {
                local ++i
                split `var', p(/)
                destring `var'1 `var'2 `var'3, replace
        }
```

```
* BCG


gen v1_b_dat3_2 = v1_b_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_b_New = mdy(v1_b_dat2, v1_b_dat1, v1_b_dat3_2) if birth_m_final != 44 &
birth_m_final != 88 & birth_m_final != 99

format vac_date_b_New %d

gen age_b_New = vac_date_b_New - birth_date_New if v1_b_dat3 != 44 & v1_b_dat3 != 88 &
v1_b_dat3 != 99

gen age_b_mo_New=(age_b_New/30.4375)

replace age_b_mo_New = 333 if age_b_mo_New < 0

replace age_b_mo_New = 444 if v1_b_dat3 == 44

replace age_b_mo_New = 888 if v1_b_dat3 == 88

replace age_b_mo_New = 999 if v1_b_dat3 == 99

gen age_b_mo_New_cat = age_b_mo_New

gen age_b_yr_New = age_b_New/365

replace age_b_mo_New_cat = 111 if (age_b_yr_New >= 0 & age_b_yr_New < 1)

replace age_b_mo_New_cat = 222 if (age_b_yr_New >= 1 & age_b_yr_New < 5)


* Polio essential


gen v2_po0_dat3_2 = v2_po0_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_po0_New = mdy(v2_po0_dat2, v2_po0_dat1, v2_po0_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_po0_New %d

gen age_po0_New = vac_date_po0_New - birth_date_New if v2_po0_dat3 != 44 & v2_po0_dat3
!= 88 & v2_po0_dat3 != 99

gen age_po0_mo_New = age_po0_New/30.4375

replace age_po0_mo_New = 333 if age_po0_mo_New < 0

replace age_po0_mo_New = 444 if v2_po0_dat3 == 44

replace age_po0_mo_New = 888 if v2_po0_dat3 == 88

replace age_po0_mo_New = 999 if v2_po0_dat3 == 99

gen age_po0_mo_New_cat = age_po0_mo_New

gen age_po0_yr_New = age_po0_New/365

replace age_po0_mo_New_cat = 111 if (age_po0_yr_New >= 0 & age_po0_yr_New < 1)

replace age_po0_mo_New_cat = 222 if (age_po0_yr_New >= 1 & age_po0_yr_New < 5)


* Polio first dose


gen v2_po1_dat3_2 = v2_po1_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_po1_New = mdy(v2_po1_dat2, v2_po1_dat1, v2_po1_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_po1_New %d

gen age_po1_New = vac_date_po1_New - birth_date_New if v2_po1_dat3 != 44 & v2_po1_dat3
!= 88 & v2_po1_dat3 != 99

gen age_po1_mo_New = age_po1_New/30.4375
```

```
replace age_po1_mo_New = 333 if age_po1_mo_New < 0

replace age_po1_mo_New = 444 if v2_po1_dat3 == 44

replace age_po1_mo_New = 888 if v2_po1_dat3 == 88

replace age_po1_mo_New = 999 if v2_po1_dat3 == 99

gen age_po1_mo_New_cat = age_po1_mo_New

gen age_po1_yr_New = age_po1_New/365

replace age_po1_mo_New_cat = 111 if (age_po1_yr_New >= 0 & age_po1_yr_New < 1)

replace age_po1_mo_New_cat = 222 if (age_po1_yr_New >= 1 & age_po1_yr_New < 5)


* Polio second dose


gen v2_po2_dat3_2 = v2_po2_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_po2_New = mdy(v2_po2_dat2, v2_po2_dat1, v2_po2_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_po2_New %d

gen age_po2_New = vac_date_po2_New - birth_date_New if v2_po2_dat3 != 44 & v2_po2_dat3
!= 88 & v2_po2_dat3 != 99

gen age_po2_mo_New = age_po2_New/30.4375

replace age_po2_mo_New = 333 if age_po2_mo_New < 0

replace age_po2_mo_New = 444 if v2_po2_dat3 == 44

replace age_po2_mo_New = 888 if v2_po2_dat3 == 88

replace age_po2_mo_New = 999 if v2_po2_dat3 == 99

gen age_po2_mo_New_cat = age_po2_mo_New

gen age_po2_yr_New = age_po2_New/365

replace age_po2_mo_New_cat = 111 if (age_po2_yr_New >= 0 & age_po2_yr_New < 1)

replace age_po2_mo_New_cat = 222 if (age_po2_yr_New >= 1 & age_po2_yr_New < 5)


* Polio third dose


gen v2_po3_dat3_2=v2_po3_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_po3_New = mdy(v2_po3_dat2, v2_po3_dat1, v2_po3_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_po3_New %d

gen age_po3_New = vac_date_po3_New - birth_date_New if v2_po3_dat3 != 44 & v2_po3_dat3
!= 88 & v2_po3_dat3 != 99

gen age_po3_mo_New = age_po3_New/30.4375

replace age_po3_mo_New = 333 if age_po3_mo_New < 0

replace age_po3_mo_New = 444 if v2_po3_dat3 == 44

replace age_po3_mo_New = 888 if v2_po3_dat3 == 88

replace age_po3_mo_New = 999 if v2_po3_dat3 == 99

gen age_po3_mo_New_cat = age_po3_mo_New

gen age_po3_yr_New = age_po3_New/365

replace age_po3_mo_New_cat = 111 if (age_po3_yr_New >= 0 & age_po3_yr_New < 1)

replace age_po3_mo_New_cat = 222 if (age_po3_yr_New >= 1 & age_po3_yr_New < 5)
```

```
* Pentavalent first dose


 gen v3_pent1_dat3_2 = v3_pent1_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_pent1_New = mdy(v3_pent1_dat2, v3_pent1_dat1, v3_pent1_dat3_2) if
birth_m_final != 44 & birth_m_final != 88 & birth_m_final != 99

 format vac_date_pent1_New %d

 gen age_pent1_New = vac_date_pent1_New - birth_date_New if v3_pent1_dat3 != 44 &
v3_pent1_dat3 != 88 & v3_pent1_dat3 != 99

 gen age_pent1_mo_New = age_pent1_New/30.4375

 replace age_pent1_mo_New = 333 if age_pent1_mo_New < 0

 replace age_pent1_mo_New = 444 if v3_pent1_dat3 == 44

 replace age_pent1_mo_New = 888 if v3_pent1_dat3 == 88

 replace age_pent1_mo_New = 999 if v3_pent1_dat3 == 99

 gen age_pent1_mo_New_cat = age_pent1_mo_New

 gen age_pent1_yr_New = age_pent1_New/365

 replace age_pent1_mo_New_cat = 111 if (age_pent1_yr_New >= 0 & age_pent1_yr_New < 1)

 replace age_pent1_mo_New_cat = 222 if (age_pent1_yr_New >= 1 & age_pent1_yr_New < 5)


* Pentavalent second dose


 gen v3_pent2_dat3_2 = v3_pent2_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_pent2_New = mdy(v3_pent2_dat2, v3_pent2_dat1, v3_pent2_dat3_2) if
birth_m_final != 44 & birth_m_final != 88 & birth_m_final != 99

 format vac_date_pent2_New %d

 gen age_pent2_New = vac_date_pent2_New - birth_date_New if v3_pent2_dat3 != 44 &
v3_pent2_dat3 != 88 & v3_pent2_dat3 != 99

 gen age_pent2_mo_New = age_pent2_New/30.4375

 replace age_pent2_mo_New = 333 if age_pent2_mo_New < 0

 replace age_pent2_mo_New = 444 if v3_pent2_dat3 == 44

 replace age_pent2_mo_New = 888 if v3_pent2_dat3 == 88

 replace age_pent2_mo_New = 999 if v3_pent2_dat3 == 99

 gen age_pent2_mo_New_cat = age_pent2_mo_New

 gen age_pent2_yr_New = age_pent2_New/365

 replace age_pent2_mo_New_cat = 111 if (age_pent2_yr_New >= 0 & age_pent2_yr_New < 1)

 replace age_pent2_mo_New_cat = 222 if (age_pent2_yr_New >= 1 & age_pent2_yr_New < 5)


* Pentavalent third dose


 gen v3_pent3_dat3_2 = v3_pent3_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_pent3_New = mdy(v3_pent3_dat2, v3_pent3_dat1, v3_pent3_dat3_2) if
birth_m_final != 44 & birth_m_final != 88 & birth_m_final != 99

 format vac_date_pent3_New %d

 gen age_pent3_New = vac_date_pent3_New - birth_date_New if v3_pent3_dat3 != 44 &
v3_pent3_dat3 != 88 & v3_pent3_dat3 != 99
```

```stata
gen age_pent3_mo_New = age_pent3_New/30.4375

replace age_pent3_mo_New = 333 if age_pent3_mo_New < 0

replace age_pent3_mo_New = 444 if v3_pent3_dat3 == 44

replace age_pent3_mo_New = 888 if v3_pent3_dat3 == 88

replace age_pent3_mo_New = 999 if v3_pent3_dat3 == 99

gen age_pent3_mo_New_cat = age_pent3_mo_New

gen age_pent3_yr_New = age_pent3_New/365

replace age_pent3_mo_New_cat = 111 if (age_pent3_yr_New >= 0 & age_pent3_yr_New < 1)

replace age_pent3_mo_New_cat = 222 if (age_pent3_yr_New >= 1 & age_pent3_yr_New < 5)


* Peneumococcal first dose


gen v6_pn1_dat3_2 = v6_pn1_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_pn1_New = mdy(v6_pn1_dat2, v6_pn1_dat1, v6_pn1_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_pn1_New %d

gen age_pn1_New = vac_date_pn1_New - birth_date_New if v6_pn1_dat3 != 44 & v6_pn1_dat3
!= 88 & v6_pn1_dat3 != 99

gen age_pn1_mo_New = age_pn1_New/30.4375

replace age_pn1_mo_New = 333 if age_pn1_mo_New < 0

replace age_pn1_mo_New = 444 if v6_pn1_dat3 == 44

replace age_pn1_mo_New = 888 if v6_pn1_dat3 == 88

replace age_pn1_mo_New = 999 if v6_pn1_dat3 == 99

gen age_pn1_mo_New_cat = age_pn1_mo_New

gen age_pn1_yr_New = age_pn1_New/365

replace age_pn1_mo_New_cat = 111 if (age_pn1_yr_New >= 0 & age_pn1_yr_New < 1)

replace age_pn1_mo_New_cat = 222 if (age_pn1_yr_New >= 1 & age_pn1_yr_New < 5)


* Peneumococcal second dose


gen v6_pn2_dat3_2 = v6_pn2_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_pn2_New = mdy(v6_pn2_dat2, v6_pn2_dat1, v6_pn2_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_pn2_New %d

gen age_pn2_New = vac_date_pn2_New - birth_date_New if v6_pn2_dat3 != 44 & v6_pn2_dat3
!= 88 & v6_pn2_dat3 != 99

gen age_pn2_mo_New = age_pn2_New/30.4375

replace age_pn2_mo_New = 333 if age_pn2_mo_New < 0

replace age_pn2_mo_New = 444 if v6_pn2_dat3 == 44

replace age_pn2_mo_New = 888 if v6_pn2_dat3 == 88

replace age_pn2_mo_New = 999 if v6_pn2_dat3 == 99

gen age_pn2_mo_New_cat = age_pn2_mo_New

gen age_pn2_yr_New = age_pn2_New/365

replace age_pn2_mo_New_cat = 111 if (age_pn2_yr_New >= 0 & age_pn2_yr_New < 1)
```

```
  replace age_pn2_mo_New_cat = 222 if (age_pn2_yr_New >= 1 & age_pn2_yr_New < 5)


* Peneumococcal third dose


 gen v6_pn3_dat3_2 = v6_pn3_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_pn3_New = mdy(v6_pn3_dat2, v6_pn3_dat1, v6_pn3_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

 format vac_date_pn3_New %d

 gen age_pn3_New = vac_date_pn3_New - birth_date_New if v6_pn3_dat3 != 44 & v6_pn3_dat3
!= 88 & v6_pn3_dat3 != 99

 gen age_pn3_mo_New = age_pn3_New/30.4375

 replace age_pn3_mo_New = 333 if age_pn3_mo_New < 0

 replace age_pn3_mo_New = 444 if v6_pn3_dat3 == 44

 replace age_pn3_mo_New = 888 if v6_pn3_dat3 == 88

 replace age_pn3_mo_New = 999 if v6_pn3_dat3 == 99

 gen age_pn3_mo_New_cat = age_pn3_mo_New

 gen age_pn3_yr_New = age_pn3_New/365

 replace age_pn3_mo_New_cat = 111 if (age_pn3_yr_New >= 0 & age_pn3_yr_New < 1)

 replace age_pn3_mo_New_cat = 222 if (age_pn3_yr_New >= 1 & age_pn3_yr_New < 5)


* Measles first dose


 gen v7_m1_dat3_2 = v7_m1_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_m1_New = mdy(v7_m1_dat2, v7_m1_dat1, v7_m1_dat3_2) if birth_m_final != 44
& birth_m_final != 88 & birth_m_final != 99

 format vac_date_m1_New %d

 gen age_m1_New = vac_date_m1_New - birth_date_New if v7_m1_dat3 != 44 & v7_m1_dat3 !=
88 & v7_m1_dat3 != 99

 gen age_m1_mo_New = age_m1_New/30.4375

 replace age_m1_mo_New = 333 if age_m1_mo_New < 0

 replace age_m1_mo_New = 444 if v7_m1_dat3 == 44

 replace age_m1_mo_New = 888 if v7_m1_dat3 == 88

 replace age_m1_mo_New = 999 if v7_m1_dat3 == 99

 gen age_m1_mo_New_cat = age_m1_mo_New

 gen age_m1_yr_New = age_m1_New/365

 replace age_m1_mo_New_cat = 111 if (age_m1_yr_New >= 0 & age_m1_yr_New < 1)

 replace age_m1_mo_New_cat = 222 if (age_m1_yr_New >= 1 & age_m1_yr_New < 5)


* Measles second dose


 gen v7_m2_dat3_2 = v7_m2_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_m2_New = mdy(v7_m2_dat2, v7_m2_dat1, v7_m2_dat3_2) if birth_m_final != 44
& birth_m_final != 88 & birth_m_final != 99

 format vac_date_m2_New %d
```

```
gen age_m2_New = vac_date_m2_New - birth_date_New if v7_m2_dat3 != 44 & v7_m2_dat3 !=
88 & v7_m2_dat3 != 99

gen age_m2_mo_New = age_m2_New/30.4375

replace age_m2_mo_New = 333 if age_m2_mo_New < 0

replace age_m2_mo_New = 444 if v7_m2_dat3 == 44

replace age_m2_mo_New = 888 if v7_m2_dat3 == 88

replace age_m2_mo_New = 999 if v7_m2_dat3 == 99

gen age_m2_mo_New_cat = age_m2_mo_New

gen age_m2_yr_New = age_m2_New/365

replace age_m2_mo_New_cat = 111 if (age_m2_yr_New >= 0 & age_m2_yr_New < 1)

replace age_m2_mo_New_cat = 222 if (age_m2_yr_New >= 1 & age_m2_yr_New < 5)




**** VITAMIN A INDICATOR


        * 1st dose
capture drop v8_va1_dat3_2

capture drop vac_date_va1_New

capture drop MonsAfterTaking_va1

capture drop age_va1_New

capture drop age_va1_mo_New_cat


gen v8_va1_dat3_2 = v8_va1_dat3 + 2000 if birth_y_final <= 2013

gen vac_date_va1_New = mdy(v8_va1_dat2, v8_va1_dat1, v8_va1_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

format vac_date_va1_New %d


tempvar DaysAfterTaking_va1

gen `DaysAfterTaking_va1' = f25b_final - vac_date_va1_New if v8_va1_dat3 != 44 &
v8_va1_dat3 != 88 & v8_va1_dat3 != 99

        gen MonsAfterTaking_va1 = `DaysAfterTaking_va1'/30.4375



gen age_va1_New = vac_date_va1_New - birth_date_New if v8_va1_dat3 != 44 & v8_va1_dat3
!= 88 & v8_va1_dat3 != 99

gen age_va1_mo_New = age_va1_New/30.4375

replace age_va1_mo_New = 333 if age_va1_mo_New < 0

replace age_va1_mo_New = 444 if v8_va1_dat3 == 44

replace age_va1_mo_New = 888 if v8_va1_dat3 == 88

replace age_va1_mo_New = 999 if v8_va1_dat3 == 99

gen age_va1_mo_New_cat = age_va1_mo_New

replace age_va1_mo_New_cat = 111 if (MonsAfterTaking_va1 >= 0 & MonsAfterTaking_va1 <=
6) // For Vit A only matters if the child was vaccinated in the 6 previous months

replace age_va1_mo_New_cat = 33333 if (MonsAfterTaking_va1 > 6 & MonsAfterTaking_va1
~=. )
```

```
    replace age_va1_mo_New_cat = 3333 if MonsAfterTaking_va1 < 0 // Took Vit A after the
interview


        * 2nd dose
 capture drop v8_va2_dat3_2

 capture drop vac_date_va2_New

 capture drop MonsAfterTaking_va2

 capture drop age_va2_New

 capture drop age_va2_mo_New_cat



 gen v8_va2_dat3_2 = v8_va2_dat3 + 2000 if birth_y_final <= 2013

 gen vac_date_va2_New = mdy(v8_va2_dat2, v8_va2_dat1, v8_va2_dat3_2) if birth_m_final !=
44 & birth_m_final != 88 & birth_m_final != 99

 format vac_date_va2_New %d


 tempvar DaysAfterTaking_va2

 gen `DaysAfterTaking_va2' = f25b_final - vac_date_va2_New if v8_va2_dat3 != 44 &
v8_va2_dat3 != 88 & v8_va2_dat3 != 99

        gen MonsAfterTaking_va2 = `DaysAfterTaking_va2'/30.4375


 gen age_va2_New = vac_date_va2_New - birth_date_New if v8_va2_dat3 != 44 & v8_va2_dat3
!= 88 & v8_va2_dat3 != 99

 gen age_va2_mo_New = age_va2_New/30.4375

 replace age_va2_mo_New = 333 if age_va2_mo_New < 0

 replace age_va2_mo_New = 444 if v8_va2_dat3 == 44

 replace age_va2_mo_New = 888 if v8_va2_dat3 == 88

 replace age_va2_mo_New = 999 if v8_va2_dat3 == 99

 gen age_va2_mo_New_cat = age_va2_mo_New

 replace age_va2_mo_New_cat = 111 if (MonsAfterTaking_va2 >= 0 & MonsAfterTaking_va2 <=
6) // For Vit A only matters if the child was vaccinated in the 6 previous months

 replace age_va2_mo_New_cat = 222 if (MonsAfterTaking_va2 > 6 & MonsAfterTaking_va2 ~=.
)

 replace age_va1_mo_New_cat = 33333 if (MonsAfterTaking_va2 > 6 & MonsAfterTaking_va2
~=. )


 replace age_va2_mo_New_cat = 3333 if MonsAfterTaking_va2 < 0 // Took Vit A after the
interview


  /*********** Source of information: vaccination card or reported


Vac_card: 1 == yes, seen ; 2 == yes, not seen ; 3 == no ; 9 == no response


Source of information (codes from vac_card):

Vaccination card 0 == 1

Reported          1 == 2 | 3
```

```
Missing           . == .  | 9


***********/
  ** adding name to the original vaccination variables


  lab var      age_b_mo_New_cat        "BCG part A"
  lab var      age_po0_mo_New_cat      "PolioEss part A"
  lab var      age_po1_mo_New_cat      "Polio1st part A"
  lab var      age_po2_mo_New_cat      "Polio2nd part A"
  lab var      age_po3_mo_New_cat      "Polio3rd part A"
  lab var      age_pent1_mo_New_cat    "PENTA1st part A"
  lab var      age_pent2_mo_New_cat    "PENTA2nd part A"
  lab var      age_pent3_mo_New_cat    "PENTA3rd part A"
  lab var      age_pn1_mo_New_cat      "Pneu1st part A"
  lab var      age_pn2_mo_New_cat      "Pneu2nd part A"
  lab var      age_pn3_mo_New_cat      "Pneu3rd part A"
  lab var      age_m1_mo_New_cat       "Meas1st part A"
  lab var      age_m2_mo_New_cat       "Meas2nd part A"
  lab var      age_va1_mo_New_cat      "VitA1st part A"
  lab var      age_va2_mo_New_cat      "VitA2nd part A"


  ** check the codes in each vaccine by rounds
              /* Variables original Codes:
"Vac 1st yr" (111)
"Vac reported" (888)
"Vac/card shown/no date" (999)
"Vac after 1st yr" (222)
"Vac before birth" (333)
"Not vaccinated" (444)
"Missings"        (.)
"Took VitA after the interview" (3333)
"Took VitA before the last 6 mths" (33333)
*/



  local dlist age_b_mo_New_cat         ///
                    age_po0_mo_New_cat      ///
                    age_po1_mo_New_cat      ///
                    age_po2_mo_New_cat      ///
                    age_po3_mo_New_cat      ///
                    age_pent1_mo_New_cat    ///
                    age_pent2_mo_New_cat    ///
```

```stata
                            age_pent3_mo_New_cat    ///
                            age_pn1_mo_New_cat      ///
                            age_pn2_mo_New_cat      ///
                            age_pn3_mo_New_cat      ///
                            age_m1_mo_New_cat       ///
                            age_m2_mo_New_cat       ///
                            age_va1_mo_New_cat      ///
                            age_va2_mo_New_cat


    display " recoding variables "
    foreach var in `dlist' {
     replace `var'=1 if `var'==111
     replace `var'=2 if `var'==222
     replace `var'=3 if `var'==333
     replace `var'=4 if `var'==444
     replace `var'=8 if `var'==888
     replace `var'=9 if `var'==999
     replace `var'=10 if `var'==3333
     replace `var'=11 if `var'==33333
    }




    display " cheking codes to be used for the vaccination indicators "
    foreach var in `dlist' {

     tab `var' f2 if (agemons>=12 & agemons<60), m
    }


    display " checking codes and vac card information "
    foreach var in `dlist' {

     tab `var' vac_card if (agemons>=12 & agemons<60), m


    }


/* generating the vacine indicators
vaccine indicators will use information from the date (section A for round 1/4) and
section B for round 4.


 Use original variable codes and add reported information for round 4:

 1 = "Card Vac <=12m" (111)

 2 = "Card Vac >12m" (222)
```

```
    3 = "Card Vac before birth" (333) // inconsistencies

    4 = "Card Not vac" (444)

    5 = "Reported Not vac part B" (section B in round 4)

    6 = "Card Not vac | Vac reported part B" // inconsistencies

    7 = "Reported Vac part B" (section B in round 4)

    8 = "Reported Vac part A" (888)

    9 = "Card Vac no date" (999)

    10 = "VitA after the interview" (3333) // inconsistencies

    11 = "Took VitA before the last 6 mths" (33333)

    . = "Missings"          - not included in the analysis*/




capture drop bcg polio0 polio1 polio2 polio3 penta1 penta2 penta3 pneu1 pneu2 pneu3
meas1 meas2 meas1or2


**BCG
 gen byte bcg = age_b_mo_New_cat           if (agemons>=12 & agemons<60)

      replace bcg=7    if bcg==. & b1==1 // vac reported in  round 4

      replace bcg=6    if bcg==4 & b1==1 // Inconsistency : Card Not Vac (4) and
Reported Vac in round 4

      replace bcg=5    if bcg==. & b1==2 // not vac reported in  round 4

      replace bcg=.    if bcg==. & b1==3 // missing reported in  round 4


 ta age_b_mo_New_cat bcg if (agemons>=12 & agemons<60), m

 ta age_b_mo_New_cat b1  if (agemons>=12 & agemons<60) & f2==4, m

 ta bcg b1                       if (agemons>=12 & agemons<60) & f2==4, m




**Polio ESS
  gen byte polio0 = age_po0_mo_New_cat if (agemons>=12 & agemons<60)

   replace polio0=7  if polio0==. & b3==1     // vac reported in  round 4

   replace polio0=6  if polio0==4 & b3==1     // Inconsistency : Card Not Vac (4) and
Reported Vac in round 4

   replace polio0=5  if polio0==. & b3==2     // not vac reported in  round 4

   replace polio0=.  if polio0==. & b3==3     // missing reported in  round 4


 ta age_po0_mo_New_cat polio0 if (agemons>=12 & agemons<60), m

 ta age_po0_mo_New_cat b3  if (agemons>=12 & agemons<60) & f2==4, m

 ta polio0 b3             if (agemons>=12 & agemons<60) & f2==4, m


**Polio 1st
 gen byte polio1 = age_po1_mo_New_cat  if (agemons>=12 & agemons<60)

  replace polio1=7   if polio1==. & (b2==1 & b4>0)   // vac reported in  round 4
```

```
   replace polio1=6   if polio1==4 & (b2==1 & b4>0)    // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

   replace polio1=5   if polio1==. & (b2==2 | b4<1)    // not vac reported in  round 4

   replace polio1=.   if polio1==. &  (b2==3 | b4==.)   // missing reported in  round 4


   ta age_po1_mo_New_cat polio1 if (agemons>=12 & agemons<60), m

   ta age_po1_mo_New_cat b4     if (agemons>=12 & agemons<60) & f2==4, m

   ta polio1 b4                 if (agemons>=12 & agemons<60) & f2==4, m


** Polio 2nd

 gen byte polio2 = age_po2_mo_New_cat if (agemons>=12 & agemons<60)

   replace polio2=7 if polio2==. & (b2==1 & b4>1)  // vac reported in  round 4

   replace polio2=6 if polio2==4 & (b2==1 & b4>1)  // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

   replace polio2=5 if polio2==. & (b2==2 | b4<2)  // not vac reported in  round 4

   replace polio2=. if polio2==. & (b2==3 | b4==.) // missing reported in  round 4


   ta age_po2_mo_New_cat polio2 if (agemons>=12 & agemons<60), m

   ta age_po2_mo_New_cat b4     if (agemons>=12 & agemons<60) & f2==4, m

   ta polio2 b4                 if (agemons>=12 & agemons<60) & f2==4, m


** Polio 3rd

 gen byte polio3 = age_po3_mo_New_cat if (agemons>=12 & agemons<60)

   replace polio3=7 if polio3==. & (b2==1 & b4>2)  // vac reported in  round 4

   replace polio3=6 if polio3==4 & (b2==1 & b4>2)  // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

   replace polio3=5 if polio3==. & (b2==2 | b4<3)  // not vac reported in  round 4

   replace polio3=. if polio3==. & (b4==.) // missing reported in  round 4


   ta age_po3_mo_New_cat polio3 if (agemons>=12 & agemons<60), m

   ta age_po3_mo_New_cat b4     if (agemons>=12 & agemons<60) & f2==4, m

   ta polio3 b4                 if (agemons>=12 & agemons<60) & f2==4, m


** Penta 1st

 gen byte penta1 = age_pent1_mo_New_cat if (agemons>=12 & agemons<60)

   replace penta1=7 if penta1==. & (b5==1 & b6>0) // vac reported in  round 4

   replace penta1=6 if penta1==4 & (b5==1 & b6>0) // Inconsistency : Card Not Vac (4) and
Reported Vac in round 4

   replace penta1=5 if penta1==. & (b5==2 | b6<1) // not vac reported in  round 4

   replace penta1=. if penta1==. & (b6==.) // missing reported in  round 4


   ta age_pent1_mo_New_cat penta1 if (agemons>=12 & agemons<60), m
```

```
   ta age_pent1_mo_New_cat b6      if (agemons>=12 & agemons<60) & f2==4, m

   ta penta1 b6                    if (agemons>=12 & agemons<60) & f2==4, m


  ** Penta 2nd
  gen byte penta2 = age_pent2_mo_New_cat if (agemons>=12 & agemons<60)

   replace penta2=7 if penta2==. & (b5==1 & b6>1) // vac reported in  round 4

   replace penta2=6 if penta2==4 & (b5==1 & b6>1) // Inconsistency : Card Not Vac (4) and
Reported Vac in round 4

   replace penta2=5 if penta2==. & (b5==2 | b6<2) // not vac reported in  round 4

   replace penta2=. if penta2==. & (b6==.) // missing reported in  round 4


  ta age_pent2_mo_New_cat penta2 if (agemons>=12 & agemons<60), m

  ta age_pent2_mo_New_cat b6      if (agemons>=12 & agemons<60) & f2==4, m

  ta penta2 b6                    if (agemons>=12 & agemons<60) & f2==4, m


  ** Penta 3rd
  gen byte penta3 = age_pent3_mo_New_cat if (agemons>=12 & agemons<60)

   replace penta3=7 if penta3==. & (b5==1 & b6>2) // vac reported in  round 4

   replace penta3=6 if penta3==4 & (b5==1 & b6>2)     // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

   replace penta3=5 if penta3==. & (b5==2 | b6<3) // not vac reported in  round 4

   replace penta3=. if penta3==. & (b6==.)        // missing reported in  round 4


  ta age_pent3_mo_New_cat penta3 if (agemons>=12 & agemons<60), m

  ta age_pent3_mo_New_cat b6      if (agemons>=12 & agemons<60) & f2==4, m

  ta penta3 b6                    if (agemons>=12 & agemons<60) & f2==4, m



  ** Pneum 1st
   gen byte pneu1 = age_pn1_mo_New_cat if (agemons>=12 & agemons<60)

    replace pneu1=7 if pneu1==. & (b7==1 & b8>0)  // vac reported in  round 4

    replace pneu1=6 if pneu1==4 & (b7==1 & b8>0)  // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

       replace pneu1=5 if pneu1==. & (b7==2 | b8<1)  // not vac reported in  round 4

       replace pneu1=. if pneu1==. & (b8==.)         // missing reported in  round 4


  ta age_pn1_mo_New_cat pneu1 if (agemons>=12 & agemons<60), m

  ta age_pn1_mo_New_cat b8     if (agemons>=12 & agemons<60) & f2==4, m

  ta pneu1 b8                  if (agemons>=12 & agemons<60) & f2==4, m


  ** Pneum 2nd
   gen byte pneu2 = age_pn2_mo_New_cat if (agemons>=12 & agemons<60)

    replace pneu2=7 if pneu2==. & (b7==1 & b8>1)  // vac reported in  round 4
```

```
    replace pneu2=6 if pneu2==4 & (b7==1 & b8>1)   // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

        replace pneu2=5 if pneu2==. & (b7==2 | b8<2)   // not vac reported in  round 4

        replace pneu2=. if pneu2==. & (b8==.)          // missing reported in  round 4



 ta age_pn2_mo_New_cat pneu2 if (agemons>=12 & agemons<60), m

 ta age_pn2_mo_New_cat b8    if (agemons>=12 & agemons<60) & f2==4, m

 ta pneu2 b8                 if (agemons>=12 & agemons<60) & f2==4, m



  ** Pneum 3rd
 gen byte pneu3 = age_pn3_mo_New_cat if (agemons>=12 & agemons<60)

    replace pneu3=7 if pneu3==. & (b7==1 & b8>2)   // vac reported in  round 4

    replace pneu3=6 if pneu3==4 & (b7==1 & b8>2)   // Inconsistency : Card Not Vac (4)
and Reported Vac in round 4

        replace pneu3=5 if pneu3==. & (b7==2 | b8<3)   // not vac reported in  round 4

        replace pneu3=. if pneu3==. & (b8==.)          // missing reported in  round 4


 ta age_pn3_mo_New_cat pneu3 if (agemons>=12 & agemons<60), m

 ta age_pn3_mo_New_cat b8    if (agemons>=12 & agemons<60) & f2==4, m

 ta pneu3 b8                 if (agemons>=12 & agemons<60) & f2==4, m


 ** Measles


 * Measles 1st
  gen byte meas1=age_m1_mo_New_cat   if (agemons>=12 & agemons<60)

  replace meas1=7 if meas1==. & (b9==1)

  replace meas1=6 if meas1==4 & (b9==1)

  replace meas1=5 if meas1==. & (b9==2)

  replace meas1=. if meas1==. & (b9==3)



 ta age_m1_mo_New_cat meas1 if (agemons>=12 & agemons<60), m

 ta age_m1_mo_New_cat b9 if (agemons>=12 & agemons<60) & f2==4, m

 ta meas1 b9 if (agemons>=12 & agemons<60) & f2==4, m



 * Measles 2nd
 gen byte meas2 = age_m2_mo_New_cat if (agemons>=12 & agemons<60)

  *replace meas2=7 if meas2==. & (b9==1)

  *replace meas2=6 if meas2==4 & (b9==1)

  *replace meas2=5 if meas2==. & (b9==2)

  *replace meas2=. if meas2==. & (b9==3)



  ta age_m2_mo_New_cat meas2 if (agemons>=12 & agemons<60), m

  ta age_m2_mo_New_cat b9    if (agemons>=12 & agemons<60) & f2==4, m
```

```stata
   ta meas2 b9                     if (agemons>=12 & agemons<60) & f2==4, m


 ** Vitamin A


 * Vitamin A 1st
 gen byte vita1 = age_va1_mo_New_cat   if (agemons>=6 & agemons<60)
  replace vita1=7 if vita1==. & (b11==1)
  replace vita1=6 if vita1==4 & (b11==1)
  replace vita1=5 if vita1==. & (b11==2)
  replace vita1=. if vita1==. & (b11==3)


 ta age_va1_mo_New_cat vita1 if (agemons>=6 & agemons<60), m
 ta age_va1_mo_New_cat b11 if (agemons>=6 & agemons<60) & f2==4, m
 ta vita1 b11 if (agemons>=6 & agemons<60) & f2==4, m


 * Vitamin A 2nd: only asks about one dose in Part B of the questionnaire, that's the
 reason for the "*" below
 gen byte vita2 = age_va2_mo_New_cat if (agemons>=6 & agemons<60)
  *replace vita2=7 if vita2==. & (b11==1)
  *replace vita2=6 if vita2==4 & (b11==1)
  *replace vita2=5 if vita2==. & (b11==2)
  *replace vita2=. if vita2==. & (b11==3)


   ta age_va2_mo_New_cat vita2 if (agemons>=6 & agemons<60), m
    ta age_va2_mo_New_cat b11     if (agemons>=6 & agemons<60) & f2==4, m
  ta vita2 b11                  if (agemons>=6 & agemons<60) & f2==4, m




   local vclist bcg polio0 polio1 polio2 polio3 penta1 penta2 penta3 pneu1 pneu2 pneu3
 meas1 meas2 vita1 vita2
 foreach var in `vclist' {
 lab var `var' "`var' A & B "
 }


   label define vacine 1 "Card Vac <=12m for vacs; <=6m for VitA 1" ///
                   2 "Card Vac >12m for vacs; >6m for VitA 2"  ///
                             3 "Card Vac before birth 3" ///  //
 inconsistencies
                   4 "Card NVac 4" ///
                   5 "Reported NVac B 5" ///
                   6 "CardNvac & RepVac B 6" ///  // inconsistencies
                   7 "Reported Vac B 7" ///       // (section B in round 4)
                   8 "Reported Vac A 8" ///    // (section A from round 1-3)
```

```
                      9 "Card Vac no date 9" ///
                                       10 "VitA after the interview 10" ///
                                       11 "Took VitA before the last 6 mths", replace
foreach var in `vclist' {
label values `var' vacine // adding labels to the variable
 tab `var' f2 if agemons<60, m
}




        capture label drop vacind
        label define vacind 1 "Card" 2 "Reported" 0 "Not vaccinated"



        **************************** VACCINATED ANYTIME BEFORE THE SURVEY



capture drop took_BCG_any
capture drop took_PolioEss_any
capture drop took_Polio1st_any
capture drop took_Polio2nd_any
capture drop took_Polio3rd_any
capture drop took_PENTA1st_any
capture drop took_PENTA2nd_any
capture drop took_PENTA3rd_any
capture drop took_Pneu1st_any
capture drop took_Pneu2nd_any
capture drop took_Pneu3rd_any
capture drop took_Meas1st_any
capture drop took_Meas2nd_any
capture drop took_MeasAny_any
capture drop took_VitA6m1st_any
capture drop took_VitA6m2nd_any
capture drop took_VitaAny_any
capture drop VitA_last6mts

capture drop took_BCG
capture drop took_PolioEss
capture drop took_Polio1st
capture drop took_Polio2nd
capture drop took_Polio3rd
capture drop took_PENTA1st
```

```
capture drop took_PENTA2nd

capture drop took_PENTA3rd

capture drop took_Pneu1st

capture drop took_Pneu2nd

capture drop took_Pneu3rd

capture drop took_Meas1st

capture drop took_Meas2nd

capture drop took_VitA6m1st

capture drop took_VitA6m2nd




        gen took_BCG=bcg

        gen took_PolioEss=polio0

        gen took_Polio1st=polio1

        gen took_Polio2nd=polio2

        gen took_Polio3rd=polio3

        gen took_PENTA1st=penta1

        gen took_PENTA2nd=penta2

        gen took_PENTA3rd=penta3

        gen took_Pneu1st=pneu1

        gen took_Pneu2nd=pneu2

        gen took_Pneu3rd=pneu3

        gen took_Meas1st=meas1

        gen took_Meas2nd=meas2

        gen took_VitA6m1st=vita1

        gen took_VitA6m2nd=vita2




 local vclist took_BCG took_PolioEss took_Polio1st took_Polio2nd took_Polio3rd
took_PENTA1st took_PENTA2nd took_PENTA3rd took_Pneu1st took_Pneu2nd took_Pneu3rd
took_Meas1st

took_Meas2nd took_VitA6m1st took_VitA6m2nd
 foreach var in `vclist' {
  *recode `var' 1/3=1 4/5=0 6/8=2 9=1 *=0 //  1 vaccinated 2 reported 0 not vaccinated
including missing values

   recode `var' 1/2=1 3/5=0 6/8=2 9=1 10=0 11=0 *=0 //  1 vaccinated 2 reported 0 not
vaccinated including missing values


  label values `var' vacind


  tab `var' f2 if agemons<60, m


  }
```

```
/*      THE IMPUTATION PROCEDURE: vaccinated anytime before the survey

Whenever the child was reported as vaccinated in a given moment, we considered he/she as
vaccinated in the following rounds.  */



xtset indkey f2


 forvalues r = 2(1)2  { // SPECIFY rounds


        foreach var in `vclist' {
                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)
                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1
        }
}


 forvalues r = 3(1)3  { // SPECIFY rounds


        foreach var in `vclist' {
                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)
                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1
        }
}


 forvalues r = 4(1)4  { // SPECIFY rounds


        foreach var in `vclist' {

                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)
                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1


                tab `var' f2 if agemons<60, m
        }
}
xtset, clear



****** INDICATORS COMPOSED BY MORE THAN ONE DOSE/VACCINE


 *** Measles and Vitamin A: we need an indicator that considers both doses together


 * Measles
```

```
  capture drop took_MeasAny


 gen took_MeasAny=1 if (took_Meas1st==1 | took_Meas2nd==1) & agemons<60

              replace took_MeasAny=2 if ((took_Meas1st==2 | took_Meas2nd==2) &
(took_Meas1st~=1 & took_Meas2nd~=1)) & agemons<60

              replace took_MeasAny=0 if ((took_Meas1st==0 & took_Meas2nd==0) &
(took_Meas1st~=1 & took_Meas2nd~=1) & (took_Meas1st~=2 & took_Meas2nd~=2)) & agemons<60


 label values took_MeasAny vacind


 * Vitamin A


 capture drop took_VitA6m


 gen took_VitA6m=1 if (took_VitA6m1st==1 | took_VitA6m2nd==1) & agemons<60

              replace took_VitA6m=2 if ((took_VitA6m1st==2 | took_VitA6m2nd==2) &
(took_VitA6m1st~=1 & took_VitA6m2nd~=1)) & agemons<60

              replace took_VitA6m=0 if ((took_VitA6m1st==0 & took_VitA6m2nd==0) &
(took_VitA6m1st~=1 & took_VitA6m2nd~=1) & (took_VitA6m1st~=2 & took_VitA6m2nd~=2)) &
agemons<60


 label values took_VitA6m vacind


 *** Fully Immunized: receiving DPT1-3, Polio-1-3, BCG and measles vaccines


 capture drop fully_immun


 gen fully_immun=1 if ((took_BCG==1 & took_PolioEss==1 & took_Polio1st==1 &
took_Polio2nd==1 & took_Polio3rd==1 & took_PENTA1st==1 & took_PENTA2nd==1 &
took_PENTA3rd==1) &

(took_Meas1st==1 | took_Meas2nd==1)) & agemons<60
        replace fully_immun=2 if ((took_BCG==2 & took_PolioEss==2 & took_Polio1st==2 &
took_Polio2nd==2 & took_Polio3rd==2 & took_PENTA1st==2 & took_PENTA2nd==2 &

took_PENTA3rd==2) & (took_Meas1st==2 | took_Meas2nd==2)) & agemons<60
        replace fully_immun=0 if (fully_immun==.) & agemons<60


 label values fully_immun vacind




             *************** INDICATORS FOR "VACCINATED IN THE FIRST YEAR OF LIFE"



        gen took_BCG_1yr=bcg

        gen took_PolioEss_1yr=polio0
```

```
        gen took_Polio1st_1yr=polio1

        gen took_Polio2nd_1yr=polio2

        gen took_Polio3rd_1yr=polio3

        gen took_PENTA1st_1yr=penta1

        gen took_PENTA2nd_1yr=penta2

        gen took_PENTA3rd_1yr=penta3

        gen took_Pneu1st_1yr=pneu1

        gen took_Pneu2nd_1yr=pneu2

        gen took_Pneu3rd_1yr=pneu3

        gen took_Meas1st_1yr=meas1

        gen took_Meas2nd_1yr=meas2

        gen took_VitA6m1st_1yr=vita1

        gen took_VitA6m2nd_1yr=vita2




 local vclist took_BCG_1yr took_PolioEss_1yr took_Polio1st_1yr took_Polio2nd_1yr
took_Polio3rd_1yr took_PENTA1st_1yr took_PENTA2nd_1yr took_PENTA3rd_1yr took_Pneu1st_1yr

took_Pneu2nd_1yr took_Pneu3rd_1yr took_Meas1st_1yr took_Meas2nd_1yr took_VitA6m1st_1yr
took_VitA6m2nd_1yr

 foreach var in `vclist' {

   *recode `var' 1/3=1 4/5=0 6/8=2 9=1 *=0 //  1 vaccinated 2 reported 0 not vaccinated
including missing values

   recode `var' 1=1 2/5=0 6/8=2 9=0 10=0 11=0 *=0 //  1 vaccinated in the 1st year of
life 2 reported 0 not vaccinated including missing values


   label values `var' vacind


   tab `var' f2 if agemons<60, m


  }




/*      THE IMPUTATION PROCEDURE: vaccinated before first year of life

Whenever the child was reported as vaccinated in a given moment, we considered he/she as
vaccinated in the following rounds. */


xtset indkey f2
 forvalues r = 2(1)2  { // SPECIFY rounds

        foreach var in `vclist' {


                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)

                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1
```

```
            }
    }
  forvalues r = 3(1)3  { // SPECIFY rounds


        foreach var in `vclist' {
                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)
                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1


        }
    }


  forvalues r = 4(1)4  { // SPECIFY rounds


        foreach var in `vclist' {
                replace `var'=L.`var' if `var'==0 & f2==`r' & (D.`var'==-1 | D.`var'==-2)
                replace `var'=L.`var' if `var'==2 & f2==`r' & D.`var'==1


                tab `var' f2 if agemons<60, m
        }
    }
xtset, clear



*******************************************************************************************



****** INDICATORS COMPOSED BY MORE THAN ONE DOSE/VACCINE



 *** Measles and Vitamin A: we need an indicator that considers both doses together (AT
LEAST one dose)



 * Measles


 gen took_MeasAny_1yr=1 if (took_Meas1st_1yr==1 | took_Meas2nd_1yr==1) & agemons<60

                replace took_MeasAny_1yr=2 if ((took_Meas1st_1yr==2 |
took_Meas2nd_1yr==2) & (took_Meas1st_1yr~=1 & took_Meas2nd_1yr~=1)) & agemons<60

                replace took_MeasAny_1yr=0 if ((took_Meas1st_1yr==0 &
took_Meas2nd_1yr==0) & (took_Meas1st_1yr~=1 & took_Meas2nd_1yr~=1) &
(took_Meas1st_1yr~=2 &

took_Meas2nd_1yr~=2)) & agemons<60


 label values took_MeasAny_1yr vacind
```

```
 * Vitamin A


 gen took_VitA6m_1yr=1 if (took_VitA6m1st_1yr==1 | took_VitA6m2nd_1yr==1) & agemons<60

            replace took_VitA6m_1yr=2 if ((took_VitA6m1st_1yr==2 |
took_VitA6m2nd_1yr==2) & (took_VitA6m1st_1yr~=1 & took_VitA6m2nd_1yr~=1)) & agemons<60

            replace took_VitA6m_1yr=0 if ((took_VitA6m1st_1yr==0 &
took_VitA6m2nd_1yr==0) & (took_VitA6m1st_1yr~=1 & took_VitA6m2nd_1yr~=1) &
(took_VitA6m1st_1yr~=2 &

took_VitA6m2nd_1yr~=2)) & agemons<60


 label values took_VitA6m_1yr vacind


 *** Fully Immunized: receiving DPT1-3, Polio-1-3, BCG and measles vaccines


 gen fully_immun_1yr=1 if ((took_BCG_1yr==1 & took_PolioEss_1yr==1 &
took_Polio1st_1yr==1 & took_Polio2nd_1yr==1 & took_Polio3rd_1yr==1 &
took_PENTA1st_1yr==1 &

took_PENTA2nd_1yr==1 & took_PENTA3rd_1yr==1) & (took_Meas1st_1yr==1 |
took_Meas2nd_1yr==1)) & agemons<60

       replace fully_immun_1yr=2 if ((took_BCG_1yr==2 & took_PolioEss_1yr==2 &
took_Polio1st_1yr==2 & took_Polio2nd_1yr==2 & took_Polio3rd_1yr==2 &
took_PENTA1st_1yr==2 &

took_PENTA2nd_1yr==2 & took_PENTA3rd_1yr==2) & (took_Meas1st_1yr==2 |
took_Meas2nd_1yr==2)) & agemons<60

       replace fully_immun_1yr=0 if (fully_immun_1yr==.) & agemons<60


 label values fully_immun_1yr vacind
```