ELFE SURVEY AT 2 MONTHS
Carried out in 2011
WEIGHTINGS at TIME 1 (child aged 2 months)

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Outline

I Introduction

Four weightings are proposed: two child weightings (M02E_PONDREF, M02E_PONDNONREF) and two family weightings (information on one out of each pair of twins, M02F2_PONDREF, M02F2_PONDNONREF). The results below are from the two child weightings; the method used for the family weighting is identical. Important note: the child and family weightings are not made to be compared.

The final sample in the maternity units (time 0) of around 18,300 infants was drawn from a sampling plan with unequal probabilities of inclusion. A cross-sectional weighting, **$POIDS_0$**, taking into account the sampling plan and non-participation at different stages, enabled inference to the whole target population on the basis of these 18,300 infants (cf. weighting of ELFE survey data from maternity units).

As a reminder, the ELFE inference population consists of living infants, born in 2011 in a maternity unit in metropolitan France, along with at most a twin, excluding highly premature infants, whose mother was aged 18 or over and able to give informed consent, notably in one of the languages offered (French, English, Arabic, or Turkish), and whose parents did not reside temporarily in metropolitan France.

At time 1 in the study (survey at age 2 months), the sample of participants became smaller: there were around 16,600 infants whose family (mother and/or father) responded to the survey. A new weighting is thus needed, $POIDS_{2M}$, that is applicable to this new sample – that is, to the infants whose families participated **at both times** (in the maternity unit and at 2 months).

time 0   time 1
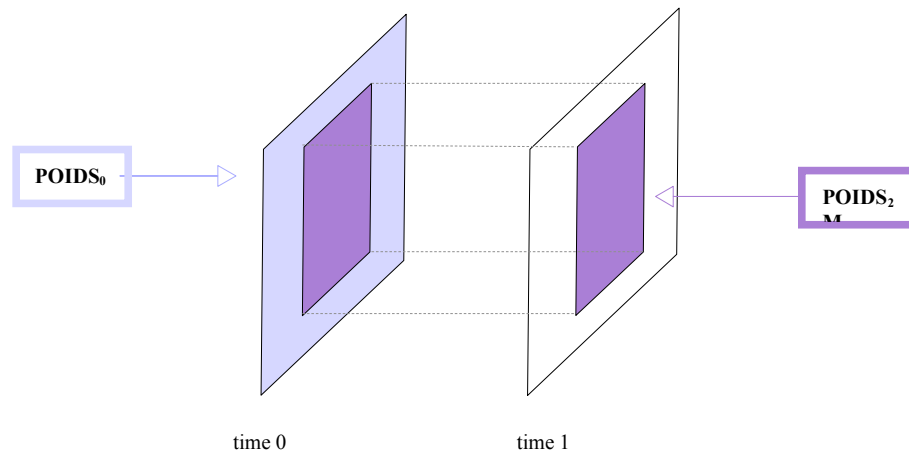
The new weighting, $POIDS_{2M}$, is both "cross-sectional" and longitudinal.[*] In other words, it can be used to create a portrait of infants in the ELFE population at time 1 ("cross-sectional") as well as to look for causal relationships between times 0 and 1 (longitudinal). Note, however, that the cross-sectional weighting cannot be used to draw inferences on all two-month-old infants in France. It is aimed at two-month-olds in the target population as defined at time 0 (for example, immigrant children born in 2011 are not included).

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[*] For the subsequent survey times, the longitudinal and cross-sectional weightings will no longer be confounded.

I – The Elfe 2 month survey

The survey at 2 months concerned the family's sociodemographic characteristics, the child's place within the family, living conditions, the pregnancy, the child's health, habitat, and environment... Mothers **and** fathers (or female partners) were interviewed at this stage.

While the data collection method was the same for all respondents (over the telephone, using CATI), different questionnaires were used depending on the child's situation at the time of the survey (parents cohabiting or not, parent with custody of the child, whether or not the child had been placed in the care of an institution or foster family, child hospitalized or not).

In calculating the weights, the questionnaires were grouped into two categories:
- reference parent questionnaires
- non-reference parent questionnaires

By definition, the reference parent questionnaire is the one with the most information on the child. It was very often completed by the mother (protocol for the survey at 2 months), unless the father had custody of the child or the mother requested that the father become the reference parent.[**]

The non-reference parent questionnaire complements the reference parent questionnaire, and is aimed at the other parent. In 99.99% of cases these were fathers (or mothers' female partners). Only one mother was identified. In this category, there are two subgroups:
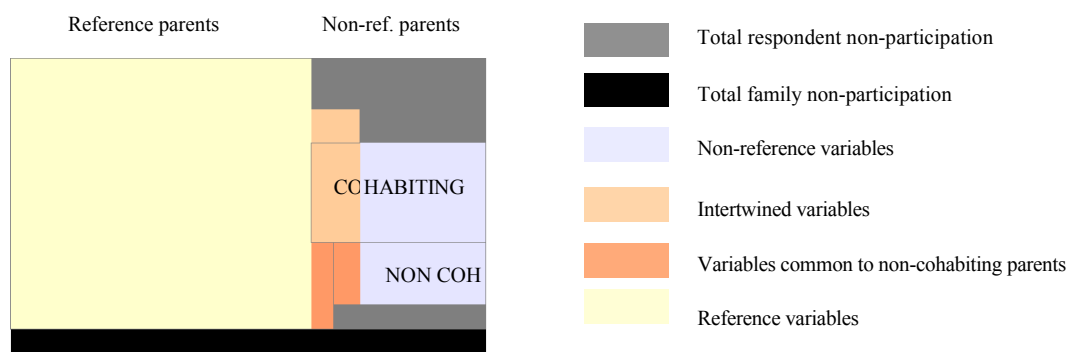- cohabiting non-reference parent
- non-cohabiting non-reference parent

In order to limit the duration of the mother's interview, a portion of the "reference mother" questionnaire was administered to cohabiting fathers (or female partners).[***] Cohabiting fathers thus responded to the cohabiting non-reference parent questionnaire as well as a portion of the reference mother questionnaire (variables concerning the household).

However, not all cohabiting fathers wished to participate. If this was the case, the mother was contacted again later and asked to continue on with the portion of the "reference mother" questionnaire that was normally answered by cohabiting fathers. This continuation of the questionnaire did not always occur (40%), leading to a smaller sample size for the variables in this part of the questionnaire, which we will call **intertwined** variables (modules: *Education*, *Situation with respect to work*, *Housing*, *Household income*, *Living conditions*). For non-cohabiting couples, responses on these variables were provided by the reference parent, and by the non-reference parent if he or she participated.

[**] The reference parent questionnaire differed depending on whether this parent was a mother or father. For example, the Pregnancy history module was only filled in if the respondent was the mother.
[***] This did not concern non-cohabiting parents (in this case the reference parent responded to the full reference questionnaire).

Reference parents	Non-ref. parents
	Total respondent non-participation
	Total family non-participation
	Non-reference variables
	Intertwined variables
	Variables common to non-cohabiting parents
	Reference variables

Simplified diagram of the distribution of questionnaires and the structure of total non-participation (not to scale)

Three types of non-participation must be considered:

–   **total non-participation** of the entire family: no one in the family participated
–   **family incompleteness**, or partial family non-response, or total non-participation by one parent: one of the parents did not participate
–   **incompleteness of the questionnaire** or partial non-response by the participant: the parent decided to participate but did not reach the end of the questionnaire (stopped the interview before the end, technical problems, failure to honour an agreed time to complete a questionnaire, …). At the least, these incomplete questionnaires include information on each individual's family situation. Intertwined variables are not taken into account in this definition of completeness.

Questionnaire (unit=infant)	Number of complete questionnaires	Number of incomplete questionnaires	Total
Reference parent variables (excluding intertwined variables)	15,872	660	16,532
of which reference parent was mother	15,759	632	16,391
of which reference parent was father	113	28	141
Non-reference parent variables (excluding intertwined variables)	12,561	226	12,787
of which cohabiting non-reference parent	12,423	211	12,634
of which non-cohabiting non-reference parent	138	15	153
Intertwined variables + common to non-cohabiting parents♦	$\approx 14{,}500$		

Major groups of variables and associated
completeness (March 2014)

The first weighting presented in this document, $poids_{2M\ A}$, was constructed for the sample of participating infants at 2 months excluding families whose reference parent filled in an incomplete questionnaire. In other words, here a participant is defined as an infant for whom there is at least **one complete reference parent questionnaire**.

The second weighting, $poids_{2M\ B}$, was created in order to enable use of the variables specific to the non-reference parent, for which the first weighting is no longer appropriate. For this weighting, a participant was thus defined as an infant for whom there is a **complete non-reference parent questionnaire**.

♦At least one of the two parents.

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reference parents · non-ref. parents · Weighting A · reference parents · non-ref. parents · Weighting B
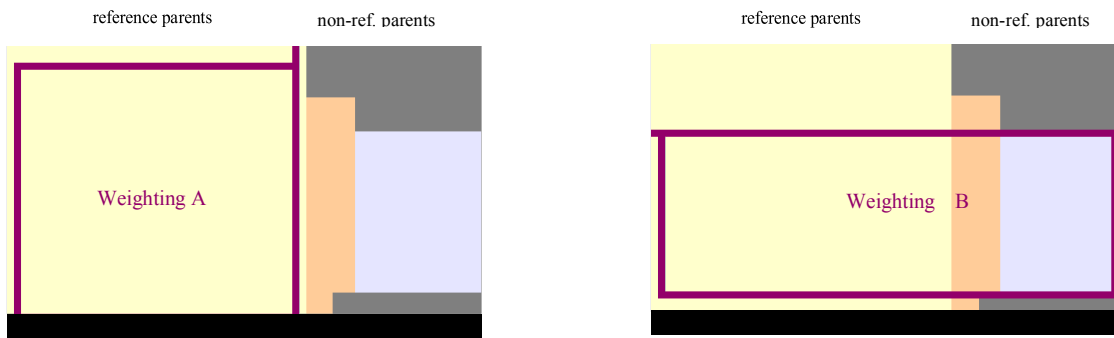
Why decide to treat incomplete questionnaires as cases of non-participation (that is, assign zero weight to these individuals)?

- their $POIDS_0$ is greater than the mean weight of complete questionnaires (this would thus mean assigning a large $POIDS_{2M}$ to partially empty questionnaires),

- they do not resemble complete questionnaires (see distribution across a selection of variables below), but total non-participants (empty): their incompleteness is not random. Treating them as respondents would thus imply the user imputing missing values in a non-random fashion.

- note: total non-participation or partial non-response at time t is linked to partial non-response at time t-1 ("." in the table).

Completeness of reference mother questionnaire at time 1 (March 2014)	Complete	Incomplete	Empty
n	15,759	632	1,837
Distribution	86.40%	3.50%	10.10%
Distribution weighted by POIDS$_0$	78.10%	**5.50%**	16.40%
Mean POIDS$_0$	37.7	**66.8**	67.9
Distributions (selected variables from time 0)			
Mother active at the time of pregnancy - yes - no - .	86% 12% 2%	68.0% 27.7% 4.3%	62.2% 30.9% 06.9%
Mother's nationality - French - non-French - .	92.7% 6.3% 1.0%	81.0% 16.3% 2.7%	74.5% 21.7% 03.8%
Father's presence at the birth - yes - no - .	82.0% 16.4% 1.6%	69.6% 26.7% 3.6%	69.1% 25.9% 04.0%

Note: where the reference questionnaire is incomplete, the non-reference questionnaire is empty.

Note that the chosen definition of non-response does not distinguish in any way between explicit refusals to participate in the survey (temporarily or definitively) and other cases (no known telephone number, unreachable, appointments not kept, mother's refusal of the father's participation...). Each of these cases likely reflects different mechanisms, but we will assume a single mechanism for the purpose of the weightings presented here.

Note also that requests to leave the study and have data destroyed decrease the sizes of working samples. The figures in

this document characterize a fixed sample.

II – REWEIGHTING

To correct the bias introduced by non-participation (avoiding the assumption that participants and non-participants have identical characteristics), we reweight the participants.

1) Description of non-participation

Sample A is the sample of infants with a participating reference parent: around 15,850.

Sample B is the sample of infants with a participating non-reference parent: around 12,550. Sample B is included in sample A.

Selected variables from time 0 in the sample from time 1 Statistical unit: the infant (March 2014)	Proportion of participants at time 0 (%)	Rate of NON-participation for each category of the variable considered in A (%)	Rate of NON-participation for each category of the variable considered in B (%)	Weighted proportion among participants at time 0 (%)	Rate of NON-participation weighted by $poids_0$ in A (%)	Rate of NON-participation weighted by $poids_0$ in B (%)
Total	100% (18,228)	12.90%	31.10%	100% (764,000)	21.00%	39.20%
Mother's age						
- [18 ; 24]	11.9	22.2	50.3	13.9	33.0	59.5
- [25 ; 29]	30.8	13.2	30.6	31.0	20.6	37.9
- [30 ; 34]	35.0	9.8	25.0	32.9	16.9	32.4
- [35 ; 39]	17.3	10.8	28.4	16.6	17.6	35.0
- over 40 years	4.2	14.5	38.0	4.6	23.0	46.4
- NR**	0.7	44.4	61.7	1.0	44.7	62.6
5 groups of regions of residence at birth						
- Ile-de-France, Centre, Picardie	27.2	15.6	36.9	30.2	24.2	44.6
- Northeast	23.6	12.1	29.9	19.0	19.9	37.3
- Northwest	16.2	9.3	25.5	15.4	14.1	30.4
- Southwest (and Corsica)	18.5	13.8	31.4	19.9	22.6	40.9
- Southwest	14.5	12.1	28.3	15.5	20.7	37.9

764,000 is the sum of $poids_0$ (child weighting from the survey in maternity units): that is, the size of the population.
** NR = non-response (partial, i.e., to the question)

Selected variables from time 0 in the sample from time 1 Statistical unit: one infant	Proportion of participants at time 0 (%)	Rate of NON-participation for each category of the variable considered in A (%)	Rate of NON-participation for each category of the variable considered in B (%)	Weighted proportion of participants at time 0 (%)	Rate of NON-participation weighted by $poids_0$ in A (%)	Rate of NON-participation weighted by $poids_0$ in B (%)
Mother's social group (crude variable)						
- 1 Farmer	0.3	3.6	19.6	0.3	4.2	19.0
- 2 Self-employed (non-farming)	3.1	14.0	36.0	2.9	15.2	36.4
- 3 Manager or higher-level intellectual occupation	15.9	6.0	18.1	11.0	6.1	18.4
- 4 Intermediate occupation	20.1	6.3	18.6	16.3	6.3	18.1
- 5 Clerical or sales worker	41.0	13.1	32.6	36.9	13.4	33.1
- 6 Manual worker	1.7	18.5	42.9	1.8	19.1	44.2
- 7 No occupation	4.7	26.9	53.2	8.6	46.4	68.2
- Cannot classify occupation	11.9	24.2	50.9	20.4	42.7	64.7
- NR	1.2	36.7	55.1	1.7	47.8	62.6
Mother's activity at the time of pregnancy						
- yes	83.1	10.1	26.5	72.3	12.9	29.5
- no	14.4	26.0	53.6	23.4	41.6	64.5
- NR	2.5	30.9	57.5	4.3	44.0	66.4
Mother living with partner						
- yes	93.3	11.7	27.8	91.1	18.8	34.9
- no	5.4	28.9	84.1	7.5	44.2	88.8
- NR	1.3	33.9	52.6	1.5	39.9	56.5
Father present for the birth						
- yes	80.3	11.1	26.3	76.3	17.4	32.6
- no	17.7	19.2	50.5	21.3	31.6	60.8
- NR	2.0	30.5	54.7	2.4	41.0	61.0
Father's activity at birth						
- yes	93.0	11.9	28.5	90.5	19.0	35.8
- no	3.5	21.9	52.7	4.8	33.2	61.5
- NR	3.5	32.0	78.9	4.7	46.3	83.2
At least 4 days of holidays during the pregnancy						
- no	45.5	16.9	24.1	49.7	27.0	48.1
- yes	52.8	9.0	38.6	48.2	14.0	29.3
- NR	1.7	29.6	51.3	2.1	37.6	57.1
Birth preparation sessions						
- yes	54.2	7.6	21.3	47.7	10.6	24.9
- no	43.7	18.6	42.4	49.7	29.7	51.9
- NR	2.1	32.5	52.5	2.6	44.3	60.3
Nationality and immigrant status of couple						
- both parents French	77.6	10.1	24.3	71.7	15.4	29.7
- Moth. a non-French national and/or immigrant, fath. French	4.7	17.6	40.7	5.9	27.9	50.8
- Fath. a non-French national and/or immigrant, moth. French	6.0	16.9	49.9	6.2	26.3	57.6
- Both parents non-French nationals and/or immigrants	6.1	31.9	65.6	9.5	44.5	71.8
- NR (for at least one of the two)	5.5	25.3	60.2	6.6	38.4	68.8

To deal with non-participation, we can use information common to participants and non-participants. For this analysis at time 1, we have all of the information from the questionnaire completed at time 0 (common to participants and non-participants at time 1, as all were participants at time 0). The table above presents non-participation rates (first unweighted, then weighted by $poids_0$) associated to a set of variables selected for the adjustment of the weightings.

A chi-square test rejected the hypothesis of independence of the participation variable and each of the variables above for each of the samples.

The category "NR" (non-response to a particular question) is interesting and important. It is interesting because total non-participation rates at 2 months were much greater when the mother did not respond (NR) to the particular question in the maternity unit; and important because for each of the chosen adjustment variables, this response category will be taken into account in calculating the reweighting.

Because much information was common to participants and non-participants at time 1, variables had to be selected for use in explaining non-participation behaviour at time 1. In theory, these variables must be correlated with non-participation, but also with the variables of interest in the survey.

2) Reweighting on the basis of non-participation

A CHAID tree (non-binary decision tree for categorical or continuous variables) was used to rapidly visualize the variables that best characterized non-participation. This showed the top variables to be *mother's social group*, *attendance at birth preparation sessions*, *parents' immigrant status*, *mother's age*, and *mother living with partner*. These variables also proved significant in the regression. These variables were integrated into the logistic regression model. Different models were compared. The model chosen was the model leading to weighted prevalences closest to reference prevalences (before truncation and calibration).

Variables included in chosen model : Mother's age, Regional group, Mother's SOC, Mother living with partner, Couple's nationality/immigrant status, Birth preparation sessions, Holidays during pregnancy

Sample B is a sub-sample of A: after the mother was contacted, if possible and following the protocol, the father was contacted. It may thus be considered that sample B includes the same phase of non-participation as sample A plus a second phase of non-participation. In anticipation of increases in the CV (coefficients of variation) and range of the weights, the adjustment on sample B is performed not in two steps (2 phases) but in just one. The adjustment variables are nearly the same as those used in weighting A, with the addition of the variables for the *father's presence for the birth* and *father's activity at the time of the birth*.

The method chosen to deal with total non-participation is based on homogeneous participant groups established using probabilities estimated by logistic regression. On the basis of the sorted scores resulting from this regression, 40 homogeneous participant groups were created and weighted by the weighting for time 0.

$$poids_{2M} = poids_0 \text{ x coefficient of adjustment for non-participation}$$

Thus, the weights of participants at time 1 were increased to compensate for non-participation at time 1.

In order to reduce the dispersion of the weights, extreme weights that fell far from the bulk of the distribution were truncated. This creates bias (which we attempted to limit by truncating as little as possible), but decreases the variance and range of the weights.

$poids_0$	Min	P5	P10	P90	P95	Max	Max/min	Sum of weights	Mean	standard deviation	CV (%)
	11	18	20	75	114	200	18	764,000	42	32	78

Statistics on final weight at time 0

P2M= $poids_0$ x coefficient of adjustment for non-participation	Min	P5	P10	P90	P95	Max	Max/min	Sum of weights	Mean	standard deviation	CV (%)
P2M_A, truncated	11	19	21	74	103	250	18	700,000	44	32	72
P2M_B, truncated	15	22	24	97	141	250	17	670,000	54	42	79

Statistics on adjusted weight of non-participation before calibration

3) Calibration

The calibration variables are the same as those used for the weighting at time 0.

Note: these sources concern the year 2011, like the information from the sample (at the time of the child's birth). This calibration at age 2 months is thus coherent. Moreover, it can be used for any survey time t: this would mean that we are seeking coherence between our sample at time t (whose 2011 characteristics we know) and additional information dating from 2011.

Calibration variables Distribution in sample A of participants at time 1	Unweighted distribution	Distribution weighted by $poids_0$	Distribution weighted by $poids_{2M\ A}$ before calibration	Source
mother's age at birth of child - [18, 24] - [25, 29] - [30, 34] - [35, 39] - + than 40 years	 10.7 30.9 36.5 17.8 04.1	 11.9 31.4 34.8 17.4 04.5	 14.3 31.9 32.2 18.8 04.8	Civil register (filtered for metrop. and mother's age 18) - 13.96% - 31.22% - 33.25% - 16.90% - 04.67%
group of regions of residence at birth - Ile-de-France/Centre/Picardie - Northeast - Northwest - Southwest - Southwest	 26.4 23.8 16.9 18.3 14.7	 29.0 19.2 16.8 19.5 15.5	 31.6 18.4 15.4 19.9 14.7	Civil register (metrop. France) - 29.96% - 19.15% - 15.42% - 19.03% - 15.54%
mother's status as immigrant at childbirth - born in France - immigrant	 88.7 11.3	 85.5 14.5	 82.3 17.7	Civil register (metrop. France) - 81.25% - 18.75%
mother's marital status at childbirth - parents married at childbirth - parents unmarried	 46.8 53.2	 45.7 54.3	 45.5 54.5	Civil register (metrop. France) - 45% - 55%
mother primipara at childbirth - yes - no	 45.8 54.2	 44.5 55.5	 43.8 56.2	ENP* (ELFE coverage) - 43.1% - 56.9%
mother's level of education at childbirth - no schooling/primary/middle school/lower - grades 10, 11, 12 - higher education	 16.5 19.8 63.7	 22.1 18.6 59.2	 24.8 20.2 55.0	ENP* (ELFE coverage) - 27.79% - 19.88% - 52.33%

*ENP: National perinatal survey

Missing values (at very low rates) for these variables were imputed using a random hot deck method (selection in proportion to $poids_0$) so that these individuals would not be excluded from the calibration.

The calibration thus ensures distributions of the weighted ELFE sample identical to those in the "Source" column. In practice, the truncation of weights after calibration (with very large weights cut of at 250) modifies these distributions (bias). The raking ratio method was used for the calibration, as the truncated logit method did not converge and did not prevent the subsequent truncation.

$poids_{2M}$	n	Min	P5	P10	P90	P95	Max	Max/min	Sum of weights	Mean	standard deviation	CV (%)
A: after calibration and truncation	15,855	13	20	22	86	118	252	18	764,000	48	37	77
B: after calibration and truncation	12,554	14	21	24	119	185	259	18	764,000	61	52	85

Statistics on final weight after calibration and truncation

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