Imputation of Non-Response on Economic Variables
in the MHAS 2018

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Introduction

This report describes the levels of non-response and the imputation procedure used in the Mexican Health and Aging Study (MHAS/ENASEM) 2018, to assign an exact amount to questions on economic value that had a non-response or a response using unfolding brackets. We used a multiple imputation technique, involving the method of sequence of regressions with a SAS-based software routine (IVEware version 0.3), developed by researchers at the Survey Methodology Program, Survey Research Center, Institute for Social Research at the University of Michigan (Raghunathan et al. 2000; Raghunathan 2001).

The methodology we are using for the 2018 imputation is similar to that used for non-response imputation in MHAS 2015 as well as the previous waves. For a more detailed description of the imputation process, the reader can refer to the companion MHAS project documents "Imputation of Non-Response on Economic Variables in the Mexican Health and Aging Study (MHAS/ENASEM)" from previous waves (2001, 2003, 2012, and 2015). To facilitate the comparison with the MHAS 2015 project document, the numbering of Tables and Diagrams was preserved.

The objective of the imputation is to provide three main variables to the users the total income and its components at the individual level, as well as, the total net worth at the household level:

- Total Income (`income_18`)
  - Individual family help income (`inc_family_18`)
  - Individual business income (`inc_business_18`)
  - Individual property rent income (`inc_property_18`)
  - Individual capital assets income (`inc_capital_18`)
  - Individual earned income (`inc_earned_18`)
  - Individual pension income (`inc_pension_18`)
  - Individual transfer income (`inc_trans_18`)
  - Individual total income (`income_18`)
- Individual/Couple Household (`k52a_18`)
- Net Worth (`net_assets_18`)

- o   Net value of houses (the individual or couple) (`net_house_18`)
- o   Net value of business (of the individual or couple) (`net_business_18`)
- o   Net value of other properties (of the individual or couple) (`net_otherprop_18`)
- o   Net value of capital assets (of the individual or couple) (`net_capital_18`)
- o   Net value of vehicles (of the individual or couple) (`net_vehicle_18`)
- o   Net value of other assets (of the individual or couple) (`net_others_18`)
- o   Other debts (of the individual or couple) (`net_debts_18`)
- o   Total net worth (of the individual or couple) (`net_assets_18`)

Economic Variable in the MHAS: Differences between 2015 and 2018

The MHAS 2018 imputed economic variables includes 43 different components of annual income flows to measure total income of a person -- and his/her spouse if applicable (Table 1), 17 different types of assets to calculate total net worth of the individual or couple (Table 2) and 13 other imputed economics variables (Table 3).

It is important to note that the process used to construct the income and net worth variables in 2018 is slightly different than the one used for previous waves. The difference is due to the changes implemented to the survey instruments and mostly to the deletion of certain variables. Tables 4.1 to 4.7 include all imputed variables by group of imputation. These tables include the variable name from the raw data file, the derived variables, imputed variables, as well as the flag that indicates if the variable was imputed. The "Derived" variables refer to the amount of expenditure, income or value of an asset as it was derived from the answers to the corresponding questions on the survey, and these may contain missing values. The "Imputed" variables contain these values plus imputed values, that is, these contain no missing values. Finally, the "Flag" variable is a dummy that indicates for each case if the variable was imputed or not.

Table 1 summarizes the changes for the components of income. First, family help income was aggregated in 2018; in previous waves the economic help received was asked separately for each child. Second, in 2018, the property's rent income and expenditure questions were only asked for the primary property while in previous rounds the respondent had the option to report up to two

properties. Third, in 2018 the option to report a third pension for each of the retirement, widow, disability and other pensions was removed. This removal of the third pension may decrease the value of total pension income in 2018. However, it is important to notice that the changes to the survey instruments were done after observing that the report of second properties and third pensions were not frequent or substantial[1]. In addition, in 2018 the option to report any income received from divorce, separation or survival pension was also removed. Lastly, starting in 2018 respondents were given the option to report up to two transfers received from public institutions. Due to the changes mentioned above, in 2018 only 43 components were included to determine total income, compared to 59 in 2015. Despite these changes, the distribution of the overall income in 2018 is comparable to the one obtained in 2015 (see Table 7.1).

For the components of total net worth, the only change in 2018 is that only one other real estate property's gross value and total debt were included, whereas 2015 asked about two other real estate properties (See Table 2). Similar to income, this change did not significantly impact the total net worth in 2018 compared to 2015 (see Table 7.2).

Selected flowcharts that illustrate the procedures for the construction of the imputed variable are available in Appendix B of this document. Only those that were modified to reflect the changes in 2018 were included. The complete IVEware program codes used in the imputation procedure are included in Appendix C.

The Impact of the Unfolding Brackets to Reduce Non-Response

Similar to what we have observed in previous waves, significant recovery of non-response was obtained through the use of follow-up brackets. The results in Table 1 indicate, for example, that among those who report business profits from the primary business (see Table 1 row "Business profits-1"), the initial non-response was 19.4%, but more than half of these cases were recovered through the use of unfolding brackets (11.3% of the 19.4%). According to the results presented in

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[1] Please refer to Table 1 in the MHAS 2015 project document, available in the study document "Imputation of Non-Response on Economic Variables in the Mexican Health and Aging Study (MHAS/ENASEM) 2015" to see the frequency of deleted questions.

Table 2, among those who own a home ("Gross value house/apartments"), the initial non-response on the value was 46.4%, but in more than two-thirds of these cases (33% of those who own a home) the value response was recovered through the use of follow-up brackets. In Table 3, the results also indicate that among those who required a hospitalization ("Total hospitalization costs"), 12.6% of 18.7% of the initial non-response on the total cost was recovered through the brackets.

Comparison of Variables With- and Without Imputations

Tables 5 present the distribution of the derived and imputed variables, for a select group of survey items. The tables show that, like the previous waves, the imputed values tend to shift the distributions to the right, as compared to the derived variables containing missing values. For example, in Table 5.2 for the variable of spouse's earned income, the derived variable contained 80.1% of the cases with 0, whereas the imputed variable contains 77.0% of cases with value 0. Part of the reason for this shift is that most non-response occurred among the cases that declared that the individual receives income from such source. Even among the cases that are greater than zero though, the imputation seems to be shifting the distribution rightwards. That is, most missing values are imputed a value towards the high end of the distribution.

Table 6.1 includes the list of imputed variables as well as the variables used to calculate each variable by type of assets and the total net worth variable. The table also includes the name of each asset and indicates whether each variable was added or subtracted for the calculations of total net worth.

Table 6.2 shows the list of imputed variables and the variables used to calculate each income variable by source and the total income variable; all variables were added for these calculations, except for "Property rent income" which adds income and subtracts expenditures.

Construction of the Variables for Total Income at the Individual Level and Net Worth at the Household Level

Similar to previous waves, we need to determine whether an income source that was "joint" was to be divided by two or by one. However, in 2018, we do not construct a new variable, we use an existing variable `k52a_18` added in section K. This variable takes the value 1 if this interview is with an individual i.e. all information refers to one person; and takes the value 2 if the interview is one within a household couple.

Similar to previous waves also, we include a constructed variable CLAVE_18 to indicate who the information on own income refers to, when there is a couple in the household. However, in 2018 to simplify the process, we added `k45d_18`, a variable that indicates the number "NP" of the person to whom the own-income questions refer to. We also added `k52a_1_18`, a variable that indicates the number "NP" of the person to whom the corresponding spouse's income questions refer to. If the value of `k45d_18` was equal to the variable NP (Person Number), then the informantion provided for the respondent own income corresponds to the selected subject. In this case, we determined the values of the income variables as OWN and recorded CLAVE_18=1. On the other hand, if the value of `k52a_1_18` was equal to "NP", we determined that the income variable corresponded to the SPOUSE'S variables. Then, we assigned CLAVE_18=2. This variable is then used to construct the final variables fot total income (`income_18`), and its components, at the individual level.

Table 7.1 presents the distribution of the total individual income variable (`income_18`) as it is obtained with- and without- imputation of missing values. Table 7.2 presents the distribution of the total net worth (`net_assets_18`) at the household level with- and without- imputation of missing values. The tables show that the distribution of both total income and total net worth is shifted towards the right with the imputed values. This is consistent with the findings in previous waves.

In Tables 8.1 and 8.2 we present the average value of total income (in monthly pesos) and distribution of income sources by gender, age and urban/rural. In MHAS 2018 we observe a decrease in the percentage of total income from property income, compared to 2015 (Table 8.1).

This pattern is consistent with what has been reported by the National Household Income and Expenditure Survey (*Encuesta Nacional de Ingreso y Gasto de los Hogares*, ENIGH) in 2016 and 2018. In the ENIGH, the proportion of income from property rental within total income went from 9% to 6% between 2016 and 2018. In the MHAS, this proportion went down from 4.1% to 0.7% in households with older adults. In addition, we found that the youngest cohorts are the ones who show the greatest decrease, which could be explained because their expenses (for example: mortgage payments) exceed the income obtained from their rent.

Tables

Table 1. Total (Individual or Couple) Income components: Distribution of responses by type

Individual (or Couple) Source of Income (*)		Total n	Receives Income			If (yes) Receives Income			
2015	2018		% Yes	% No	% NR/DK	n	% Actual Value	% Bracketed Value	% Missing
Family help income_1									
Family help income_2									
Family help income_3									
Family help income_4	Family help income (G18a)	10,718	31.9	68.0	0.1	3,414	88.4	5.9	5.7
Family help income_5									
Family help income_6									
Family help income_7									
Business income-1	Business income-1 (K11_1)	11,401	11.4	88.2	0.3	1,305	82.5	12.4	5.1
Business income-2	Business income-2 (K11_2)	11,401	0.4	99.5	0.0	51	84.3	13.7	2.0
Business expenditure-1	Business expenditure-1 (K13_1)	11,401	12.9	87.0	0.1	1,474	81.4	10.1	8.5
Business expenditure-2	Business expenditure-2 (K13_2)	11,401	0.6	99.4	0.0	66	78.8	10.6	10.6
Business profits-1	Business profits-1 (K15_1)	11,401	12.1	87.8	0.1	1,384	80.6	11.3	8.2
Business profits-2	Business profits-2 (K15_2)	11,401	0.5	99.5	0.0	58	77.6	6.9	15.5
Rent from residence	Rent from residence (J36b)	11,401	2.2	97.5	0.3	251	92.4	5.2	2.4
Property rent income-1	Property rent income (K27_1)	11,401	2.0	97.8	0.2	228	86.0	11.0	3.1
Property rent income-2									
Property expenditure-1	Property expenditure (K29_1)	11,401	2.8	97.0	0.2	321	77.3	11.5	11.2
Property expenditure-2									
Capital assets income-1	Capital assets income-1 (K36_1)	11,401	1.9	97.6	0.5	221	54.3	30.8	14.9
Capital assets income-2	Capital assets income-2 (K36_2)	11,401	0.1	99.7	0.2	9	88.9	0.0	11.1
Capital assets income-3	Capital assets income-3 (K36_3)	11,401	0.1	99.7	0.2	14	57.1	21.4	21.4
Own earned income-1	Own earned income-1 (K47a)	11,401	16.1	83.8	0.1	1,830	95.2	2.7	2.0
Own earned income-2	Own earned income-2 (K48a)	11,401	11.7	88.2	0.2	1,329	93.2	3.8	3.1
Own earned income-3	Own earned income-3 (K50a)	11,401	0.5	99.5	0.0	52	90.4	3.8	5.8
Own earned income-4	Own earned income-4 (K51a)	11,401	0.2	99.8	0.0	19	84.2	5.3	10.5
Spouse's earned income-1	Spouse's earned income-1 (K53a)	6,099	22.9	76.8	0.3	1,397	83.5	10.7	5.9
Spouse's earned income-2	Spouse's earned income-2 (K54a)	6,099	14.1	84.9	1.0	862	76.3	15.2	8.5
Spouse's earned income-3	Spouse's earned income-3 (K56a)	6,099	0.4	99.5	0.0	27	74.1	14.8	11.1
Spouse's earned income-4	Spouse's earned income-4 (K57a)	6,099	0.2	99.8	0.0	11	81.8	9.1	9.1
Own pension income - retirement-1	Own pension income - retirement-1 (K61_1_1)	11,401	16.6	83.3	0.1	1,894	92.1	4.8	3.1
Own pension income - retirement-2	Own pension income - retirement-2 (K61_1_2)	11,401	0.7	99.3	0.0	77	83.1	10.4	6.5
Own pension income - retirement-3									
Own pension income - widow-1	Own pension income - widow-1 (K61_2_1)	11,401	7.1	92.7	0.2	811	94.1	4.3	1.6
Own pension income - widow-2	Own pension income - widow-2 (K61_2_2)	11,401	0.2	99.8	0.0	24	79.2	4.2	16.7
Own pension income - widow-3									
Own pension income - disability-1	Own pension income - disability-1 (K61_3_1)	11,401	0.8	99.0	0.1	95	94.7	4.2	1.1
Own pension income - disability-2	Own pension income - disability-2 (K61_3_2)	11,401	0.0	100.0	0.0	0	0.0	0.0	0.0
Own pension income - disability-3									
Own other pension income-1	Own other pension income-1 (K61_4_1)	11,401	2.5	97.4	0.1	287	99.0	0.7	0.3
Own other pension income-2	Own other pension income-2 (K61_4_2)	11,401	0.0	100.0	0.0	5	100.0	0.0	0.0
Own other pension income-3									
Spouse's pension income - retirement-1	Spouse's pension income - retirement-1(K67_1_1)	6,099	15.9	79.1	5.0	968	82.3	11.1	6.6
Spouse's pension income - retirement-2	Spouse's pension income - retirement-2(K67_1_2)	6,099	0.5	99.5	0.0	30	83.3	3.3	13.3

Spouse's pension income - retirement-3									
Spouse's pension income - widow-1	Spouse's pension income - widow-1 (K67_2_1)	6,099	0.3	94.8	5.0	16	93.8	0.0	6.3
Spouse's pension income - widow-2	Spouse's pension income - widow-2 (K67_2_2)	6,099	0.0	100.0	0.0	1	0.0	0.0	100.0
Spouse's pension income - widow-3									
Spouse's pension income - disability-1	Spouse's pension income - disability-1 (K67_3_1)	6,099	0.8	94.2	5.0	49	85.7	6.1	8.2
Spouse's pension income - disability-2	Spouse's pension income - disability-2 (K67_3_2)	6,099	0.1	100.0	0.0	3	0.0	0.0	100.0
Spouse's pension income - disability-3									
Spouse's other pension income-1	Spouse's other pension income-1 (K67_4_1)	6,099	1.7	93.3	5.0	106	95.3	2.8	1.9
Spouse's other pension income-2	Spouse's other pension income-2 (K67_4_2)	6,099	0.1	99.9	0.0	6	0.0	0.0	100.0
Spouse's other pension income-3									
Own transfer income from institutions	Own transfer income from institutions-1 (K80_1_1)	11,401	24.9	74.9	0.2	2,844	97.6	0.0	2.4
	Own transfer income from institutions-2 (K80_1_2)	11,401	2.2	97.8	0.0	248	91.1	0.0	8.9
Own transfer income from individuals									
Own transfer income from properties	Own transfer income from properties (K80_3)	11,401	0.9	98.9	0.2	105	87.6	0.0	12.4
Spouse's transfer income from institutions	Spouse's transfer income from institutions-1 (K83_1_1)	6,099	17.1	77.8	5.1	1,040	95.0	0.0	5.0
	Spouse's transfer income from institutions-2 (K83_1_2)	6,099	1.7	98.3	0.0	104	73.1	0.0	26.9
Spouse's transfer income from individuals									
Spouse's transfer income from properties	Spouse's transfer income from properties (K83_2)	6,099	0.5	94.4	5.0	32	90.6	0.0	9.4

Notes: Rows shaded in light grey indicate the variables not included in 2018; (*) Numbers in parentheses are the variable name in the MHAS/ENASEM 2018 data files.

Table 2. Total (Individual or Couple) Net Worth Components -- Distribution of Reponses by Type

Individual (or Couple) Type of Asset (*)		Total n	Owns Type of Asset			If (yes) Owns Asset, Response to Value			
2015	2018		% Yes	% No	% NR/DK	n	% Actual Value	% Bracketed Value	% Missing
Gross value houses/apartments	Gross value houses/apartments (J31)	11,401	74.9	23.7	1.4	8,538	53.6	33.0	13.4
Total debt houses/apartments	Total debt houses/apartments (J28)	11,401	4.8	95.1	0.1	552	62.9	24.1	13.0
Total debt mortgages/loans	Total debt mortgages/loans (J26)	11,401	4.9	95.1	0.1	553	84.4	8.7	6.9
Net value other houses/apartments	Net value other houses/apartments (J34)	11,401	9.5	89.9	0.5	1,080	59.7	27.5	12.8
Gross value basiness-1	Gross value basiness-1 (K8_1)	11,401	14.7	85.2	0.1	1,680	58.6	29.7	11.7
Gross value basiness-2	Gross value basiness-2 (K8_2)	11,401	0.7	99.3	0.0	77	71.4	14.3	14.3
Total debt business-1	Total debt business-1 (K4_1)	11,401	1.1	98.8	0.1	123	81.3	12.2	6.5
Total debt business-2	Total debt business-2 (K4_2)	11,401	0.1	99.8	0.0	6	100.0	0.0	0.0
Gross value other real estate properties-1	Gross value other real estate properties (K24_1)	11,401	6.2	93.6	0.2	710	65.8	23.5	10.7
Gross value other real estate properties-2									
Total debt other real estate properties-1	Total debt other real estate properties (K20_1)	11,401	0.5	99.4	0.2	52	69.2	15.4	15.4
Total debt other real estate properties-2									
Net value capital assets-1	Net value capital assets-1 (K33_1)	11,401	5.9	93.8	0.3	672	62.1	27.5	10.4
Net value capital assets-2	Net value capital assets-2 (K33_2)	11,401	0.5	99.3	0.2	60	85.0	8.3	6.7
Net value capital assets-3	Net value capital assets-3 (K33_3)	11,401	0.2	99.6	0.2	27	37.0	33.3	29.6
Gloss value vehicles	Gloss value vehicles (K42)	11,401	29.6	70.2	0.2	3,373	83.3	11.4	5.2
Total debt vehicles	Total debt vehicles (K40)	11,401	3.2	96.6	0.2	364	79.9	15.1	4.9
Net value other assets	Net value other assets (K44)	11,401	71.2	28.8	0.0	8,114	66.3	22.7	11.0
Other debts	Other debts (K86)	11,401	16.1	83.6	0.3	1,835	90.8	7.3	1.9

Notes: Rows shaded in light grey indicate the variables not included in 2018; (*) Numbers in parentheses are the variable name in the MHAS/ENASEM 2018 data files.

Table 3. Other imputed variables (Individual or Couple) -- Distribution of Reponses by Type

Individual (or Couple) type of income, expenditures and costs (*)		Total n	Receives/has income, expenditure and costs			If (yes) Receives/has income, expenditure and costs, Response to Value			
2015	**2018**		**% Yes**	**% No**	**% NR/DK**	**n**	**% Actual Value**	**% Bracketed Value**	**% Missing**
Total hospitalization cost	Total hospitalization cost (D6)	17,114	4.3	95.3	0.4	744	81.3	12.6	6.0
Total curandero/homeopath costs									
Total dentist costs	Total dentist costs (D9_1)	17,114	28.7	71.4	0.0	4,904	94.6	3.1	2.3
Total outpatient procedure costs	Total outpatient procedure costs (D9_2)	17,114	2.4	97.6	0.0	409	79.5	3.4	17.1
Total medical visits costs	Total medical visits costs (D9_3)	17,114	28.3	71.8	0.0	4,834	93.2	3.6	3.3
Medications costs	Medications costs (D12a)	17,114	47.2	52.8	0.0	8,084	93.9	3.5	2.7
Total hospitalization costs – Next of kin	Total hospitalization costs – Next of kin (SD5)	1,135	21.6	77.6	0.8	245	71.0	22.9	6.0
Medical visits pay in–kind - Next of kin	Medical visits pay in–kind - Next of kin (SD8)	1,135	42.4	57.6	0.0	481	77.3	18.7	4.0
Medications costs – Next of kin	Medications costs – Next of kin (SD10a)	1,135	59.2	40.8	0.0	672	81.4	15.5	3.1
Economic Help to Parents									
Family help given_1 Family help given_2 Family help given_3 Family help given_4 Family help given_5 Family help given_6 Family help given_7	Family help given (G8c)	10,718	21.6	78.3	0.1	2,310	86.6	9.4	4.0
Monthly rent houses/apartments	Monthly rent houses/apartments (J20)	11,401	4.5	95.5	0.0	510	93.5	2.9	3.5
Household Consumption	Household Consumption (K88)	11,401	100.0	0.0	0.0	11,401	91.4	5.3	3.3
Pensions income before death	Pensions income before death (K101)	538	5.0	94.8	0.2	27	85.2	7.4	7.4
Pensions income after death	Pensions income after death (K103)	538	26.6	73.2	0.2	143	92.3	3.5	4.2
Death expenditures	Death expenditures (K111)	538	90.9	9.1	0.0	489	72.2	20.2	7.6

Notes: Rows shaded in light grey indicate the variables not included in 2018; (*) Numbers in parentheses are the variable name in the MHAS/ENASEM 2018 data files.

Table 4. Groups of Variables and Names Used in the Imputation Procedure

Table 4.1. GROUP 1. Respondent's Total Income Components (Own or Joint Income)

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Family help income	G18a	amg18a_18	imamg18a_18	g18a_imp_18
Business income-1	K11_1	amk11_1_18	imamk11_1_18	k11_1_imp_18
Business income-2	K11_2	amk11_2_18	imamk11_2_18	k11_2_imp_18
Business expenditures-1	K13_1	amk13_1_18	imamk13_1_18	k13_1_imp_18
Business expenditures-2	K13_2	amk13_2_18	imamk13_2_18	k13_2_imp_18
Business profits-1	K15_1	amk15_1_18	imamk15_1_18	k15_1_imp_18
Business profits-2	K15_2	amk15_2_18	imamk15_2_18	k15_2_imp_18
Property rent income	K27_1	amk27_1_18	imamk27_1_18	k27_1_imp_18
Property expenditure	K29_1	amk29_1_18	imamk29_1_18	k29_1_imp_18
Capital assets income-1	K36_1	amk36_1_18	imamk36_1_18	k36_1_imp_18
Capital assets income-2	K36_2	amk36_2_18	imamk36_2_18	k36_2_imp_18
Capital assets income-3	K36_3	amk36_3_18	imamk36_3_18	k36_3_imp_18
Own earned income-1	K47a	amk47a_18	imamk47a_18	k47a_imp_18
Own earned income-2	K48a	amk48a_18	imamk48a_18	k48a_imp_18
Own earned income-3	K50a	amk50a_18	imamk50a_18	k50a_imp_18
Own earned income-4	K51a	amk51a_18	imamk51a_18	k51a_imp_18
Own pension income - retirement-1	K61_1_1	amk61_1_1_18	imamk61_1_1_18	k61_1_1_imp_18
Own pension income - retirement-2	K61_1_2	amk61_1_2_18	imamk61_1_2_18	k61_1_2_imp_18
Own pension income - widow-1	K61_2_1	amk61_2_1_18	imamk61_2_1_18	k61_2_1_imp_18
Own pension income - widow-2	K61_2_2	amk61_2_2_18	imamk61_2_2_18	k61_2_2_imp_18
Own pension income - disability-1	K61_3_1	amk61_3_1_18	imamk61_3_1_18	k61_3_1_imp_18
Own pension income - disability-2	K61_3_2	amk61_3_2_18	imamk61_3_2_18	k61_3_2_imp_18
Own other pension income-1	K61_4_1	amk61_4_1_18	imamk61_4_1_18	k61_4_1_imp_18
Own other pension income-2	K61_4_2	amk61_4_2_18	imamk61_4_2_18	k61_4_2_imp_18
Own transfer income from institutions-1	K80_1_1	amk80_1_1_18	imamk80_1_1_18	k80_1_1_imp_18
Own transfer income from institutions-2	K80_1_2	amk80_1_2_18	imamk80_1_2_18	k80_1_2_imp_18
Own transfer income from properties	K80_3	amk80_3_18	imamk80_3_18	k80_3_imp_18

Table 4.2. GROUP 2. Spouse's Total Income Component

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Spouse's earned income-1	K53a	amk53a_18	imamk53a_18	k53a_imp_18
Spouse's earned income-2	K54a	amk54a_18	imamk54a_18	k54a_imp_18
Spouse's earned income-3	K56a	amk56a_18	imamk56a_18	k56a_imp_18
Spouse's earned income-4	K57a	amk57a_18	imamk57a_18	k57a_imp_18
Spouse's pension income - retirement-1	K67_1_1	amk67_1_1_18	imamk67_1_1_18	k67_1_1_imp_18
Spouse's pension income - retirement-2	K67_1_2	amk67_1_2_18	imamk67_1_2_18	k67_1_2_imp_18
Spouse's pension income - widow-1	K67_2_1	amk67_2_1_18	imamk67_2_1_18	k67_2_1_imp_18
Spouse's pension income - widow-2	K67_2_2	amk67_2_2_18	imamk67_2_2_18	k67_2_2_imp_18
Spouse's pension income - disability-1	K67_3_1	amk67_3_1_18	imamk67_3_1_18	k67_3_1_imp_18
Spouse's pension income - disability-2	K67_3_2	amk67_3_2_18	imamk67_3_2_18	k67_3_2_imp_18
Spouse's other pension income-1	K67_4_1	amk67_4_1_18	imamk67_4_1_18	k67_4_1_imp_18
Spouse's other pension income-2	K67_4_2	amk67_4_2_18	imamk67_4_2_18	k67_4_2_imp_18
Spouse's transfer income from institutions-1	K83_1_1	amk83_1_1_18	imamk83_1_1_18	k83_1_1_imp_18
Spouse's transfer income from institutions-2	K83_1_2	amk83_1_2_18	imamk83_1_2_18	k83_1_2_imp_18
Spouse's transfer income from properties	K83_2	amk83_2_18	imamk83_2_18	k83_2_imp_18

Table 4.3. GROUP 3. Components of Individual (or Couple) Total Net Worth and Household Consumption

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Gross value houses/apartments	J31	amj31_18	imamj31_18	j31_imp_18
Total debt houses/apartments	J28	amj28_18	imamj28_18	j28_imp_18
Total debt mortgages/loans	J26	amj26_18	imamj26_18	j26_imp_18
Net value other houses/apartments	J34	amj34_18	imamj34_18	j34_imp_18
Gross value basiness-1	K8_1	amk8_1_18	imamk8_1_18	k8_1_imp_18
Gross value basiness-2	K8_2	amk8_2_18	imamk8_2_18	k8_2_imp_18
Total debt business-1	K4_1	amk4_1_18	imamk4_1_18	k4_1_imp_18
Total debt business-2	K4_2	amk4_2_18	imamk4_2_18	k4_2_imp_18
Gross value other real estate properties	K24_1	amk24_1_18	imamk24_1_18	k24_1_imp_18
Total debt other real estate properties	K20_1	amk20_1_18	imamk20_1_18	k20_1_imp_18
Net value capital assets-1	K33_1	amk33_1_18	imamk33_1_18	k33_1_imp_18
Net value capital assets-2	K33_2	amk33_2_18	imamk33_2_18	k33_2_imp_18
Net value capital assets-3	K33_3	amk33_3_18	imamk33_3_18	k33_3_imp_18
Gloss value vehicles	K42	amk42_18	imamk42_18	k42_imp_18
Total debt vehicles	K40	amk40_18	imamk40_18	k40_imp_18
Net value other assets	K44	amk44_18	imamk44_18	k44_imp_18
Other debts	K86	amk86_18	imamk86_18	k86_imp_18
Total cost household consumption	K88	amk88_18	imamk88_18	k88_imp_18

Table 4.4. GROUP 4. Hospitalizations and other utilization of services

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Total hospitalization cost	D6	amd6_18	imamd6_18	d6_imp_18
Total dentist costs	D9_1	amd9_1_18	imamd9_1_18	d9_1_imp_18
Total outpatient procedure costs	D9_2	amd9_2_18	imamd9_2_18	d9_2_imp_18
Total medical visits costs	D9_3	amd9_3_18	imamd9_3_18	d9_3_imp_18
Medications costs	D12a	amd12a_18	imamd12a_18	d12a_imp_18
Total hospitalization costs – Next of kin	SD5	amsd5_18	imamsd5_18	sd5_imp_18
Medical visits pay in-kind – Next of kin	SD8	amsd8_18	imamsd8_18	sd8_imp_18
Medications costs – Next of kin	SD10a	amsd10a_18	imamsd10a_18	sd10a_imp_18

Table 4.5. GROUP 5. Household Monthly Rent

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Monthly rent houses/apartments	J20	amj20_18	imamj20_18	j20_imp_18

Table 4.6. GROUP 6. Pensions Income

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Pensions income before death	K101	amk101_18	imamk101_18	k101_imp_18
Pensions income after death	K103	amk103_18	imamk103_18	k103_imp_18
Death expenditures	K111	amk111_18	imamk111_18	k111_imp_18

Expenditures associated with the death of the spouse such as funeral costs, legal fees, etc.., medical costs are excluded.

Table 4.7. GROUP 7. Help Given

Income component	Raw variable	Derived variable	Imputed variable	Flag variable
Family help given	G8c	amg8c_18	imamg8c_18	g8c_imp_18

Tables 5. Distribution of Select Derived and Imputed Variables by Range of Amount

SELECT INCOME SOURCES

Table 5.1 Own earned income-1 (K47a)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-3,000	413	23.7	424	23.1
3,001-4,400	285	16.4	292	15.9
4,401-6,000	370	21.2	375	20.5
6,001-10,000	380	21.8	389	21.2
>10,000	295	16.9	353	19.3
Sub-total	1,743	100.0	1,833	100.0
0	9,558	84.6	9,568	83.9
Total	11,301		11,401	

Table 5.2 Spouse's earned income-1 (K53a)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-3,000	236	20.2	261	18.6
3,001-4,800	279	23.9	307	21.9
4,801-6,000	205	17.6	227	16.2
6,001-10,000	268	23.0	317	22.6
>10,000	178	15.3	288	20.6
Sub-total	1,166	100.0	1,400	100.0
0	4,685	80.1	4,699	77.0
Total	5,851		6,099	

Table 5.3 Business income-1 (K11_1)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-1,800	219	20.4	227	17.2
1,801-4,000	243	22.6	252	19.1
4,001-8,000	230	21.4	250	19.0
8,001-16,000	172	16.0	213	16.2
>16,000	212	19.7	376	28.5
Sub-total	1,076	100.0	1,318	100.0
0	10,058	90.3	10,083	88.4
Total	11,134		11,401	

Table 5.4 Business expenditure-1 (K13_1)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-1,000	337	28.1	340	23.9
1,001-2,000	188	15.7	193	13.6
2,001-4,000	198	16.5	209	14.7
4,001-10,000	261	21.8	292	20.5
>10,000	216	18.0	388	27.3
Sub-total	1,200	100.0	1,422	100.0
0	9,920	89.2	9,979	87.5
Total	11,120		11,401	

Table 5.5 Own pension income - retirement-1 (K61_1_1)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-2,400	388	22.2	403	21.3
2,401-2,900	310	17.8	313	16.5
2,901-5,500	354	20.3	370	19.5
5,501-12,600	344	19.7	393	20.7
>12,600	348	20.0	417	22.0
Sub-total	1,744	100.0	1,896	100.0
0	9,492	84.5	9,505	83.4
Total	11,236		11,401	

Table 5.6 Family help income (G18a)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-400	608	20.1	734	21.5
401-1,000	878	29.1	925	27.1
1,001-1,800	334	11.1	382	11.2
1,801-3,000	679	22.5	743	21.7
>3,000	520	17.2	634	18.5
Sub-total	3,019	100.0	3,418	100.0
0	7,292	70.7	7,300	68.1
Total	10,311		10,718	

SELECT NET WORTH COMPONENTS

Table 5.7 Gross value houses/apartments (J31)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-200,000	1,153	25.2	1,687	19.5
200,001-400,000	858	18.8	1,370	15.9
400,001-600,000	774	16.9	1,323	15.3
600,001-1,000,000	1,033	22.6	2,072	24.0
>1,000,000	757	16.5	2,187	25.3
Sub-total	4,575	100.0	8,639	100.0
0	2,706	37.2	2,762	24.2
Total	7,281		11,401	

Table 5.8 Gross value basiness-1 (K8_1)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-10,000	227	23.0	266	15.8
10,001-44,500	167	17.0	255	15.2
44,501-150,000	219	22.2	359	21.4
150,001-500,000	197	20.0	364	21.7
>500,000	175	17.8	436	26.0
Sub-total	985	100.0	1,680	100.0
0	9,714	90.8	9,721	85.3
Total	10,699		11,401	

Table 5.9 Net value capital assets-1 (K33_1)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-10,000	98	23.5	112	16.6
10,001-25,000	79	18.9	112	16.6
25,001-50,000	75	18.0	117	17.4
50,001-160,000	82	19.7	134	19.9
>160,000	83	19.9	199	29.5
Sub-total	417	100.0	674	100.0
0	10,699	96.2	10,727	94.1
Total	11,116		11,401	

Table 5.10 Gloss value vehicles (K42)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-20,000	650	23.1	696	20.6
20,001-35,000	521	18.5	551	16.3
35,001-60,000	625	22.2	679	20.1
60,001-120,000	482	17.1	614	18.2
>120,000	533	19.0	840	24.9
Sub-total	2,811	100.0	3,380	100.0
0	8,006	74.0	8,021	70.4
Total	10,817		11,401	

Table 5.11 Net value other assets (K44)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-3,000	1,240	23.1	1,244	17.6
3,001-10,000	1,515	28.2	1,532	21.7
10,001-20,000	721	13.4	740	10.5
20,001-60,000	840	15.6	936	13.2
>60,000	1,062	19.7	2,619	37.0
Sub-total	5,378	100.0	7,071	100.0
0	3,287	37.9	4,330	38.0
Total	8,665		11,401	

Tables 6. Variables Used in the Calculation of Total Net Worth and Total Income

Table 6.1 Total (Individual or Couple) Net Worth Components

List of variables according to treatment given for the calculation of total net worth

Type of Net Assets and Variable Name	Constructed variable	Raw variable	Derived variable	Imputed variable	Treatment
Total net worth	net_assets_18				
Net value of houses (Added)	net_house_18				
Added					
Gross value houses/apartments		J31	amj31_18	imamj31_18	Joint
Net value other houses/apartments		J34	amj34_18	imamj34_18	Joint
Deducted					
Total debt houses/apartments		J28	amj28_18	imamj28_18	Joint
Net value of business (Added)	net_business_18				
Added					
Gross value basiness-1		K8_1	amk8_1_18	imamk8_1_18	Joint
Gross value basiness-2		K8_2	amk8_2_18	imamk8_2_18	Joint
Deducted					
Total debt business-1		K4_1	amk4_1_18	imamk4_1_18	Joint
Total debt business-2		K4_2	amk4_2_18	imamk4_2_18	Joint
Net value of other properties (Added)	net_otherprop_18				
Added					
Gross value other real estate properties		K24_1	amk24_1_18	imamk24_1_18	Joint
Deducted					
Total debt other real estate properties		K20_1	amk20_1_18	imamk20_1_18	Joint
Net value of capital assets (Added)	net_capital_18				
Added					
Net value capital assets-1		K33_1	amk33_1_18	imamk33_1_18	Joint
Net value capital assets-2		K33_2	amk33_2_18	imamk33_2_18	Joint
Net value capital assets-3		K33_3	amk33_3_18	imamk33_3_18	Joint
Net value of vehicles (Added)	net_vehicle_18				
Added					
Gloss value vehicles		K42	amk42_18	imamk42_18	Joint
Deducted					
Total debt vehicles		K40	amk40_18	imamk40_18	Joint
Net value of other assets (Added)	net_others_18				
Net value other assets		K44	amk44_18	imamk44_18	Joint
Other debts (Deducted)	net_debts_18				
Other debts		K86	amk86_18	imamk86_18	Joint

Table 6.2 Total (Individual or Couple) Income Components

List of variables according to treatment given for the calculation of total income

Income Sources and Variable Name	Income variable	Raw variable	Derived variable	Imputed variable	Treatment
Total income	income_18				
Family help income	inc_family_18				
Added variables					
Family help income		G18a	amg18a_18	imamg18a_18	Joint
Business income	inc_business_18				
Added variables					
Business profits-1		K15_1	amk15_1_18	imamk15_1_18	Joint
Business profits-2		K15_2	amk15_2_18	imamk15_2_18	Joint
Property rent income	inc_property_18				
Added variables					
Rent from residence		J36b	amj36b_18	imamj36b_18	Joint
Property rent income		K27_1	amk27_1_18	imamk27_1_18	Joint
Deducted variables					
Property expenditure		K29_1	amk29_1_18	imamk29_1_18	Joint
Capital assets income	inc_capital_18				
Added variables					
Capital assets income-1		K36_1	amk36_1_18	imamk36_1_18	Joint
Capital assets income-2		K36_2	amk36_2_18	imamk36_2_18	Joint
Capital assets income-3		K36_3	amk36_3_18	imamk36_3_18	Joint
Earned income	inc_earned_18				
Added variables					
Own earned income-1		K47a	amk47a_18	imamk47a_18	Individual
Own earned income-2		K48a	amk48a_18	imamk48a_18	Individual
Own earned income-3		K50a	amk50a_18	imamk50a_18	Individual
Own earned income-4		K51a	amk51a_18	imamk51a_18	Individual
Added variables					
Spouse's earned income-1		K53a	amk53a_18	imamk53a_18	Individual
Spouse's earned income-2		K54a	amk54a_18	imamk54a_18	Individual
Spouse's earned income-3		K56a	amk56a_18	imamk56a_18	Individual
Spouse's earned income-4		K57a	amk57a_18	imamk57a_18	Individual
Pension income	inc_pension_18				
Added variables					
Own pension income - retirement-1		K61_1_1	amk61_1_1_18	imamk61_1_1_18	Individual
Own pension income - retirement-2		K61_1_2	amk61_1_2_18	imamk61_1_2_18	Individual
Own pension income - widow-1		K61_2_1	amk61_2_1_18	imamk61_2_1_18	Individual
Own pension income - widow-2		K61_2_2	amk61_2_2_18	imamk61_2_2_18	Individual
Own pension income - disability-1		K61_3_1	amk61_3_1_18	imamk61_3_1_18	Individual
Own pension income - disability-2		K61_3_2	amk61_3_2_18	imamk61_3_2_18	Individual
Own other pension income-1		K61_4_1	amk61_4_1_18	imamk61_4_1_18	Individual
Own other pension income-2		K61_4_2	amk61_4_2_18	imamk61_4_2_18	Individual
Added variables					
Spouse's pension income - retirement-1		K67_1_1	amk67_1_1_18	imamk67_1_1_18	Individual
Spouse's pension income - retirement-2		K67_1_2	amk67_1_2_18	imamk67_1_2_18	Individual
Spouse's pension income - widow-1		K67_2_1	amk67_2_1_18	imamk67_2_1_18	Individual
Spouse's pension income - widow-2		K67_2_2	amk67_2_2_18	imamk67_2_2_18	Individual
Spouse's pension income - disability-1		K67_3_1	amk67_3_1_18	imamk67_3_1_18	Individual
Spouse's pension income - disability-2		K67_3_2	amk67_3_2_18	imamk67_3_2_18	Individual
Spouse's other pension income-1		K67_4_1	amk67_4_1_18	imamk67_4_1_18	Individual

Spouse's other pension income-2		K67_4_2	amk67_4_2_18	imamk67_4_2_18	Individual
Transfer income	inc_trans_18				
Added variables					
Own transfer income from institutions-1		K80_1_1	amk80_1_1_18	imamk80_1_1_18	Individual
Own transfer income from institutions-2		K80_1_2	amk80_1_2_18	imamk80_1_2_18	Individual
Own transfer income from properties		K80_3	amk80_3_18	imamk80_3_18	Individual
Added variables					
Spouse's transfer income from institutions-1		K83_1_1	amk83_1_1_18	imamk83_1_1_18	Individual
Spouse's transfer income from institutions-2		K83_1_2	amk83_1_2_18	imamk83_1_2_18	Individual
Spouse's transfer income from properties		K83_2	amk83_2_18	imamk83_2_18	Individual

Tables 7. Distribution of Income and Assets (Derived and Imputed) by Range of Amount

Table 7.1. Total Individual Income

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-800	2,071	20.0	2,306	18.4
801-2,000	2,074	20.1	2,340	18.7
2,001-4,000	2,225	21.5	2,514	20.1
4,001-8,000	1,962	19.0	2,371	18.9
>8,000	2,009	19.4	2,998	23.9
Sub-total	10,341	100.0	12,529	100.0
<=0	3,484	25.2	3,762	23.1
Total	13,825		16,291	

Table 7.2. Total Net Worth (Individual or Couple)

Amount	Derived Variable		Imputed Variable	
	Freq.	%	Freq.	%
1-68,000	921	20.0	1,125	10.9
68,001-300,000	955	20.8	1,681	16.3
300,001-600,000	943	20.5	1,854	18.0
600,001-1,095,000	864	18.8	2,331	22.6
>1,095,000	919	20.0	3,323	32.2
Sub-total	4,602	100.0	10,314	100.0
<=0	853	15.6	1,087	9.5
Total	5,455		11,401	

Tables 8. Mean Total Income at the Individual Level and Total Net Worth al the Household Level, and Distribution across Income Sources and Type of Assets by Key Characteristics

Table 8.1. Mean total income (monthly pesos) and distribution of income sources by characteristics for 2018 MHAS

Variables	Total income	% Distribution across Income Sources							
		Total	Earned	Pension	Transfer	Business	Property rent	Capital	Family help
Total (n=16,291)	8,878	100.0	21.1	17.8	28.1	21.5	0.7	6.2	4.7
Gender									
Male	10,907	100.0	27.2	19.5	22.5	21.1	0.7	6.4	2.7
Female	7,384	100.0	14.6	15.9	34.1	22.0	0.7	6.0	6.8
Age									
Less than 50	6,211	100.0	46.9	2.3	23.3	18.4	-1.3	7.7	2.6
50-59	9,426	100.0	35.4	7.8	24.7	24.9	0.2	4.4	2.6
60-69	8,796	100.0	16.0	24.5	26.6	18.5	0.9	9.2	4.4
70 and more	8,966	100.0	4.4	26.5	34.0	20.4	1.3	5.6	7.7
Urban/Rural									
Less urban	6,788	100.0	15.7	12.6	23.2	36.4	1.3	4.5	6.2
More urban	10,501	100.0	23.8	20.3	30.5	14.0	0.4	7.0	3.9

Table 8.2. Total net value of assets and distribution of type of assets by key characteristics for 2018 MHAS

Variables	Total net value of assets	% Distribution across Type of Net Assets							
		Total	Housing	Business	Real estate	Capital assets	Vehicle	Assets not listed	(-) Debts
Total (n=11,401)	979,615	100.0	70.8	8.0	4.6	1.8	2.9	12.9	1.0
Individual/couple									
One person	830,938	100.0	74.4	7.2	3.8	1.8	1.7	11.8	0.7
Couple	1,108,864	100.0	68.5	8.5	5.1	1.7	3.8	13.7	1.2

Appendix A. Descriptive Statistics of Derived
(Un-imputed) and Imputed Variables

Appendix A1 MHAS/ENASEM 2018

Total Sampled's Income Components

(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk11_1_18	11134	2964.66	76340.12	0	6600000
imamk11_1_18	11401	5125.89	96413.79	0	6600000
amk11_2_18	11388	82.3033	5671.95	0	600000
imamk11_2_18	11401	127.3148	6064.92	0	600000
amk13_1_18	11120	1960.74	56173.32	0	5300000
imamk13_1_18	11401	3672.44	72652.62	0	5300000
amk13_2_18	11387	121.2541	6728.17	0	540000
imamk13_2_18	11401	216.0591	8723.18	0	540000
amk15_1_18	11125	1379.42	50021.34	0	5000000
imamk15_1_18	11401	2779.9	56542.7	0	5000000
amk15_2_18	11388	22.39515	731.011	0	60000
imamk15_2_18	11401	40.57204	1152.62	0	60000
amk27_1_18	11347	146.8521	2390.63	0	125000
imamk27_1_18	11401	197.214	2715.34	0	125000
amk29_1_18	11310	127.1216	4072.21	0	400000
imamk29_1_18	11401	170.9859	4240.09	0	400000
amk36_1_18	11243	128.9243	6863.4	0	600000
imamk36_1_18	11401	413.1177	8339.2	0	600000
amk36_2_18	11376	13.51028	930.2003	0	89893
imamk36_2_18	11401	21.36532	1253.77	0	89893
amk36_3_18	11374	73.26921	7056	0	750000
imamk36_3_18	11401	402.0142	17211.15	0	750000
amk47a_18	11301	1341.9	11382.99	0	800000
imamk47a_18	11401	1474.11	11543.95	0	800000
amk48a_18	11291	124.3843	1472.49	0	100000
imamk48a_18	11401	154.5446	1534.74	0	100000
amk50a_18	11396	43.71613	1643.2	0	140000
imamk50a_18	11401	48.22676	1664.28	0	140000
amk51a_18	11398	1.052816	42.54529	0	3333.33
imamk51a_18	11401	2.405872	146.8263	0	15000
amk61_1_1_18	11236	1207.57	5375.14	0	300000
imamk61_1_1_18	11401	1359.84	5587.55	0	300000
amk61_1_2_18	11388	49.94398	1008.3	0	50000
imamk61_1_2_18	11401	59.80671	1077.56	0	50000
amk61_2_1_18	11327	251.5988	1588.68	0	88000
imamk61_2_1_18	11401	270.962	1623.5	0	88000
amk61_2_2_18	11396	6.291681	175.6525	0	8500
imamk61_2_2_18	11401	7.234948	187.0709	0	8500
amk61_3_1_18	11381	34.87286	639.4961	0	28000
imamk61_3_1_18	11401	36.97986	654.2091	0	28000
amk61_3_2_18	11401	0	0	0	0
imamk61_3_2_18	11401	0	0	0	0
amk61_4_1_18	11384	41.57528	667.968	0	45000
imamk61_4_1_18	11401	42.36048	671.0384	0	45000
amk61_4_2_18	11401	0.552583	31.20605	0	2500

Variable	N	Mean	Std. Dev.	Minimum	Maximum
imamk61_4_2_18	11401	0.552583	31.20605	0	2500
amk80_1_1_18	11311	197.2558	608.4912	0	20000
imamk80_1_1_18	11401	203.1286	613.8909	0	20000
amk80_1_2_18	11379	17.76615	246.4117	0	20000
imamk80_1_2_18	11401	20.24007	256.9919	0	20000
amk80_3_18	11362	1869.11	55162.8	0	4000000
imamk80_3_18	11401	2651.05	62533.07	0	4000000
amj36b_18	11351	58.42481	645.2777	0	30000
imamj36b_18	11401	68.82234	708.8941	0	30000
amg18a_18	10311	582.8471	1722.89	0	40000
imamg18a_18	10718	638.8209	1762.1	0	40000

Appendix A2 MHAS/ENASEM 2018

Total Spouse's Income Components

(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk53a_18	5851	1490.76	4910.33	0	120000
imamk53a_18	6099	1841.32	5335.08	0	120000
amk54a_18	5837	94.47376	786.7186	0	50000
imamk54a_18	6099	264.8215	1439.52	0	50000
amk56a_18	6091	13.3804	427.2299	0	30000
imamk56a_18	6099	41.64617	982.2416	0	30000
amk57a_18	6095	0.797101	36.46338	0	2500
imamk57a_18	6099	0.917142	37.20171	0	2500
amk67_1_1_18	5624	888.4463	3433.28	0	80000
imamk67_1_1_18	6099	1080.11	3695.06	0	80000
amk67_1_2_18	6094	20.00591	410.7574	0	16000
imamk67_1_2_18	6099	20.31808	411.3713	0	16000
amk67_2_1_18	5794	12.70625	391.2887	0	22000
imamk67_2_1_18	6099	19.28513	551.3356	0	22000
amk67_2_2_18	6098	0	0	0	0
imamk67_2_2_18	6099	0	0	0	0
amk67_3_1_18	5788	27.33587	490.3993	0	25000
imamk67_3_1_18	6099	36.64028	567.6039	0	25000
amk67_3_2_18	6096	0	0	0	0
imamk67_3_2_18	6099	0	0	0	0
amk67_4_1_18	5789	25.15029	457.0454	0	30000
imamk67_4_1_18	6099	27.39925	466.6956	0	30000
amk67_4_2_18	6093	0	0	0	0
imamk67_4_2_18	6099	0	0	0	0
amk83_1_1_18	5736	146.0309	1142.3	0	80000
imamk83_1_1_18	6099	167.2754	1152.86	0	80000
amk83_1_2_18	6071	9.479822	94.67748	0	2500
imamk83_1_2_18	6099	9.440892	94.46161	0	2500
amk83_2_18	5789	877.1722	25962.16	0	1500000
imamk83_2_18	6099	1585.59	37983.09	0	1500000

Appendix A3 MHAS/ENASEM 2018

Total Assets and Household Components

(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amj31_18	7281	478960.4	839382.7	0	9800000
imamj31_18	11401	627897.4	809507.4	0	9800000
amj28_18	11186	8284.55	102631.9	0	6000000
imamj28_18	11401	14944.74	120520	0	6000000
amj26_18	11305	351.2033	11870.99	0	990000
imamj26_18	11401	411.8041	11975.19	0	990000
amj34_18	10898	45547.8	300045.4	0	8000000
imamj34_18	11401	80632.93	376513.9	0	8000000
amj20_18	11368	108.3968	1105.15	0	80000
imamj20_18	11401	126.0912	1176.72	0	80000
amk8_1_18	10699	43695.14	365733.3	0	9000000
imamk8_1_18	11401	77266.06	415471.7	0	9000000
amk8_2_18	11379	1722.43	64536.08	0	5000000
imamk8_2_18	11401	3133.58	83599.95	0	5000000
amk4_1_18	11362	1476.15	57691.48	0	5000000
imamk4_1_18	11401	1976.91	59586.61	0	5000000
amk4_2_18	11380	68.5413	4714.4	0	400000
imamk4_2_18	11401	68.41505	4710.05	0	400000
amk20_1_18	11366	804.2075	23369.92	0	1500000
imamk20_1_18	11401	2273.1	50823.82	0	1500000
amk24_1_18	11140	30194.41	277619.7	0	9000000
imamk24_1_18	11401	47008.36	316698.3	0	9000000
amk33_1_18	11116	6430.34	104041.8	0	8000000
imamk33_1_18	11401	12262.45	119244.1	0	8000000
amk33_2_18	11369	223.5719	7765.01	0	600000
imamk33_2_18	11401	308.7621	8592.79	0	600000
amk33_3_18	11366	671.8625	49471.81	0	5000000
imamk33_3_18	11401	4635.86	148853.1	0	5000000
amk40_18	11300	2698.78	22619.51	0	500000
imamk40_18	11401	3708.09	26770.11	0	500000
amk42_18	10817	24653.72	116424.6	0	6000000
imamk42_18	11401	32544.56	123511.4	0	6000000
amk44_18	8665	82851.67	391783.5	0	9000000
imamk44_18	11401	126663	384431.5	0	9000000
amk86_18	11201	8455.01	77011.71	0	5000000
imamk86_18	11401	9766.58	78448.52	0	5000000
amk88_18	10424	5254.66	49693.55	100	5000000
imamk88_18	11401	6571.18	48319.84	15.53829	5000000

Appendix A4 MHAS/ENASEM 2018

Hospital and other utilization of services

(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amd6_18	16907	1155.95	10772.95	0	350000
imamd6_18	17114	1601.04	12876.59	0	350000
amd9_1_18	16849	1071.04	6430.59	0	600000
imamd9_1_18	17114	1136.36	6458.61	0	600000

amd9_2_18	17030	244.9497	3202.47	0	200000
imamd9_2_18	17114	269.1047	3356.38	0	200000
amd9_3_18	16783	849.4297	5058.79	0	200000
imamd9_3_18	17114	961.2025	5191.55	0	200000
amd12a_18	16618	587.2562	6778.84	0	800000
imamd12a_18	17114	688.6327	6779.21	0	800000
amsd5_18	1055	7837.39	40847.22	0	700000
imamsd5_18	1135	8765.46	41098.28	0	700000
amsd8_18	1026	4301.26	21359.7	0	428000
imamsd8_18	1135	5306.68	21764.33	0	428000
amsd10a_18	1010	3155.07	10982.32	0	150000
imamsd10a_18	1135	3680.07	10967.38	0	150000

Appendix A5 MHAS/ENASEM 2018
Pension Income and Death Expenditures
(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk101_18	533	179.9531	1759.16	0	30000
imamk101_18	538	227.2041	1959.27	0	30000
amk103_18	526	1078.77	3194.96	0	47000
imamk103_18	538	1088.07	3198.48	0	47000
amk111_18	402	24037.52	38037.64	0	500000
imamk111_18	538	26530.96	36524.48	0	500000

Appendix A6 MHAS/ENASEM 2018
Help Given
(Including zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amg8c_18	10396	559.981	4202.86	0	320000
imamg8c_18	10718	683.2961	4318.91	0	320000

Appendix A7 MHAS/ENASEM 2018
Total Sampled's Income Components
(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk11_1_18	1076	30677.03	243933.5	20	6600000
imamk11_1_18	1318	44340.15	280576.4	19.14209	6600000
amk11_2_18	43	21796.98	90761.12	300	600000
imamk11_2_18	54	26879.92	84730.11	300	600000
amk13_1_18	1200	18169.53	170198.2	100	5300000
imamk13_1_18	1422	29444.11	203928.3	100	5300000
amk13_2_18	52	26552.33	96906.13	60	540000
imamk13_2_18	62	39730.48	112361.7	60	540000
amk15_1_18	1115	13763.24	157527.2	100	5000000
imamk15_1_18	1346	23546.58	163121.3	13.3924	5000000
amk15_2_18	45	5667.47	10274.92	150	60000
imamk15_2_18	52	8895.42	14719.14	150	60000
amk27_1_18	196	8501.69	16159.76	100	125000

imamk27_1_18	228	9861.57	16569.6	100	125000
amk29_1_18	248	5797.36	26949.01	50	400000
imamk29_1_18	286	6816.12	25955.35	50	400000
amk36_1_18	120	12079.13	65609.37	50	600000
imamk36_1_18	222	21216.01	56070.49	1	600000
amk36_2_18	8	19211.63	31377.56	600	89893
imamk36_2_18	9	27065.11	37637.45	600	89893
amk36_3_18	8	104170.5	261719.3	166	750000
imamk36_3_18	13	352566.5	383280.8	166	750000
amk47a_18	11301	1341.9	11382.99	0	800000
imamk47a_18	11401	1474.11	11543.95	0	800000
amk48a_18	11291	124.3843	1472.49	0	100000
imamk48a_18	11401	154.5446	1534.74	0	100000
amk50a_18	11396	43.71613	1643.2	0	140000
imamk50a_18	11401	48.22676	1664.28	0	140000
amk51a_18	11398	1.052816	42.54529	0	3333.33
imamk51a_18	11401	2.405872	146.8263	0	15000
amk61_1_1_18	1744	7779.94	11621.97	400	300000
imamk61_1_1_18	1896	8176.99	11491.11	46.71822	300000
amk61_1_2_18	64	8886.91	10197.07	450	50000
imamk61_1_2_18	76	8971.79	9770.82	376.6516	50000
amk61_2_1_18	763	3735.07	4948.31	550	88000
imamk61_2_1_18	812	3804.48	4856.98	550	88000
amk61_2_2_18	19	3773.68	2127.29	1500	8500
imamk61_2_2_18	24	3436.9	2246.26	142.2817	8500
amk61_3_1_18	90	4409.87	5725.49	230	28000
imamk61_3_1_18	95	4437.97	5671.49	1	28000
amk61_3_2_18	0	.	.	.	.
imamk61_3_2_18	0	.	.	.	.
amk61_4_1_18	284	1666.52	3902.43	140	45000
imamk61_4_1_18	287	1682.76	3895.98	140	45000
amk61_4_2_18	5	1260	889.8033	550	2500
imamk61_4_2_18	5	1260	889.8033	550	2500
amk80_1_1_18	2775	804.0216	1010.73	100	20000
imamk80_1_1_18	2852	812.0157	1006.14	35.64374	20000
amk80_1_2_18	226	894.5177	1510.87	100	20000
imamk80_1_2_18	248	930.4718	1482.51	100	20000
amk80_3_18	92	230834.7	571370.8	250	4000000
imamk80_3_18	105	287853.2	588007.3	1	4000000
amj36b_18	232	2858.53	3524.17	200	30000
imamj36b_18	252	3113.66	3647.7	200	30000
amg18a_18	3019	1990.64	2708.71	2.083333	40000
imamg18a_18	3418	2003.18	2646.61	1.775014	40000

Appendix A8 MHAS/ENASEM 2018

Total Spouse's Income Components

(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk53a_18	1166	7480.67	8730.81	150	120000
imamk53a_18	1400	8021.58	8628.73	145.7799	120000
amk54a_18	658	838.0598	2207.64	16.66667	50000
imamk54a_18	886	1822.96	3381.52	16.66667	50000
amk56a_18	20	4075	6409.52	300	30000
imamk56a_18	27	9407.41	11609.74	300	30000
amk57a_18	9	539.8148	827.9281	50	2500
imamk57a_18	11	508.5136	748.3393	50	2500
amk67_1_1_18	797	6269.29	7034.95	200	80000
imamk67_1_1_18	987	6674.36	6860.41	7.153428	80000
amk67_1_2_18	25	4876.64	4261.84	1000	16000
imamk67_1_2_18	30	4130.67	4245.03	1	16000
amk67_2_1_18	15	4908	6132.79	550	22000
imamk67_2_1_18	17	6918.82	8070.36	550	22000
amk67_2_2_18	0	.	.	.	.
imamk67_2_2_18	0	.	.	.	.
amk67_3_1_18	42	3767.14	4417.29	800	25000
imamk67_3_1_18	53	4216.4	4451.82	800	25000
amk67_3_2_18	0	.	.	.	.
imamk67_3_2_18	0	.	.	.	.
amk67_4_1_18	101	1441.53	3166.76	190	30000
imamk67_4_1_18	107	1561.76	3179.79	190	30000
amk67_4_2_18	0	.	.	.	.
imamk67_4_2_18	0	.	.	.	.
amk83_1_1_18	988	847.8067	2643.16	100	80000
imamk83_1_1_18	1066	957.0474	2617.94	4.954758	80000
amk83_1_2_18	76	757.2632	389.4268	125	2500
imamk83_1_2_18	104	553.6538	473.334	1	2500
amk83_2_18	29	175101.7	328231.5	550	1500000
imamk83_2_18	35	276299.9	424993.2	550	1500000

Appendix A9 MHAS/ENASEM 2018

Total Assets and Household Components

(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amj31_18	4575	762253.7	951523.8	300	9800000
imamj31_18	8639	828644.3	835744	300	9800000
amj28_18	348	266295.8	520210.7	133	6000000
imamj28_18	563	302637.7	455428.4	1	6000000
amj26_18	468	8483.66	57809.34	100	990000
imamj26_18	518	9063.67	55529.79	54.2453	990000
amj34_18	645	769581.3	982479.4	250	8000000
imamj34_18	1081	850412.6	917141.2	250	8000000
amj20_18	477	2583.34	4770.66	200	80000
imamj20_18	510	2818.76	4838.13	200	80000
amk8_1_18	985	474613.5	1117816	100	9000000
imamk8_1_18	1680	524351.4	968223	100	9000000

amk8_2_18	55	356354.6	865358.9	300	5000000
imamk8_2_18	77	463973.7	911982.3	300	5000000
amk4_1_18	100	167719.8	594797.8	500	5000000
imamk4_1_18	122	184744	548153.1	500	5000000
amk4_2_18	6	130000	174102.3	3000	400000
imamk4_2_18	6	130000	174102.3	3000	400000
amk20_1_18	36	253906.2	333531.7	445	1500000
imamk20_1_18	51	508149.5	571608.2	445	1500000
amk24_1_18	467	720269.1	1159395	400	9000000
imamk24_1_18	713	751672.3	1037049	221.8798	9000000
amk33_1_18	417	171414.1	510758.2	35	8000000
imamk33_1_18	674	207424.6	447568.8	35	8000000
amk33_2_18	51	49839	105766.3	789	600000
imamk33_2_18	62	56777.36	102665.4	789	600000
amk33_3_18	10	763638.9	1563084	789	5000000
imamk33_3_18	25	2114136	2424684	1	5000000
amk40_18	291	104797.8	95906.14	700	500000
imamk40_18	365	115824.6	97070.35	700	500000
amk42_18	2811	94869.91	213330.1	1100	6000000
imamk42_18	3380	109775.3	207332.3	457.09	6000000
amk44_18	5378	133490.1	490474.8	100	9000000
imamk44_18	7071	204226.4	471653.3	100	9000000
amk86_18	1667	56811.36	192671	100	5000000
imamk86_18	1839	60548.58	187334.3	100	5000000
amk88_18	10424	5254.66	49693.55	100	5000000
imamk88_18	11401	6571.18	48319.84	15.53829	5000000

Appendix A10 MHAS/ENASEM 2018

Hospital and other utilization of services

(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amd6_18	605	32303.44	47334.9	1	350000
imamd6_18	745	36778.75	50182.12	1	350000
amd9_1_18	4639	3890.05	11800.36	1	600000
imamd9_1_18	4825	4030.61	11675.19	1	600000
amd9_2_18	325	12835.36	19414.7	1	200000
imamd9_2_18	344	13387.96	19644.36	1	200000
amd9_3_18	4503	3165.88	9384.08	1	200000
imamd9_3_18	4741	3469.74	9412.8	1	200000
amd12a_18	7588	1286.11	9987.31	1	800000
imamd12a_18	7980	1476.85	9869.34	1	800000
amsd5_18	174	47519.78	90932.31	10	700000
imamsd5_18	195	51019.44	87785.69	10	700000
amsd8_18	372	11863.14	34213.2	16	428000
imamsd8_18	422	14272.7	33876.86	16	428000
amsd10a_18	547	5825.63	14397.98	5	150000
imamsd10a_18	621	6726.05	14123.81	5	150000

Appendix A11 MHAS/ENASEM 2018
Pension Income and Death Expenditures
(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amk101_18	23	4170.22	7578.73	500	30000
imamk101_18	27	4527.25	7685.59	500	30000
amk103_18	132	4298.73	5192.45	500	47000
imamk103_18	135	4336.17	5177.65	500	47000
amk111_18	353	27374.17	39454.71	883	500000
imamk111_18	471	30305	37544.55	139.5737	500000

Appendix A12 MHAS/ENASEM 2018
Help Given
(Without zeros)

Variable	N	Mean	Std. Dev.	Minimum	Maximum
amg8c_18	2001	2909.33	9217.95	1.5	320000
imamg8c_18	2312	3167.63	8867.26	1.5	320000

Appendix B. SELECTED Diagrams

of Procedure for Construction of the

Imputed Variables

Note: for the construction of other imputed variables, please refer to **"Imputation of Non-Response on Economic Variables in the Mexican Health and Aging Study (MHAS/ENASEM) 2015"** Appendix B.

Group 1. Family help income.
G18

Start= g17_18

Response to receives source of income

NR (8) / DK (9)

No (2, .)

ImAm=0

Mixed imputation
Then
Low=0,
Up=Max

ImAm= 0

ImAm=YYY

Yes (1)

RF/DK in exact amount and brackets

Then
Low=1, Up=Max
ImAm=YYY

Response to amount
g18a_2_18

(monthly)

Exact amount:

G18_monthly
ImAm=YYY

RF/DK in exact amount

Then use Brackets
g18b1_18, g18b2_18

ImAm=YYY
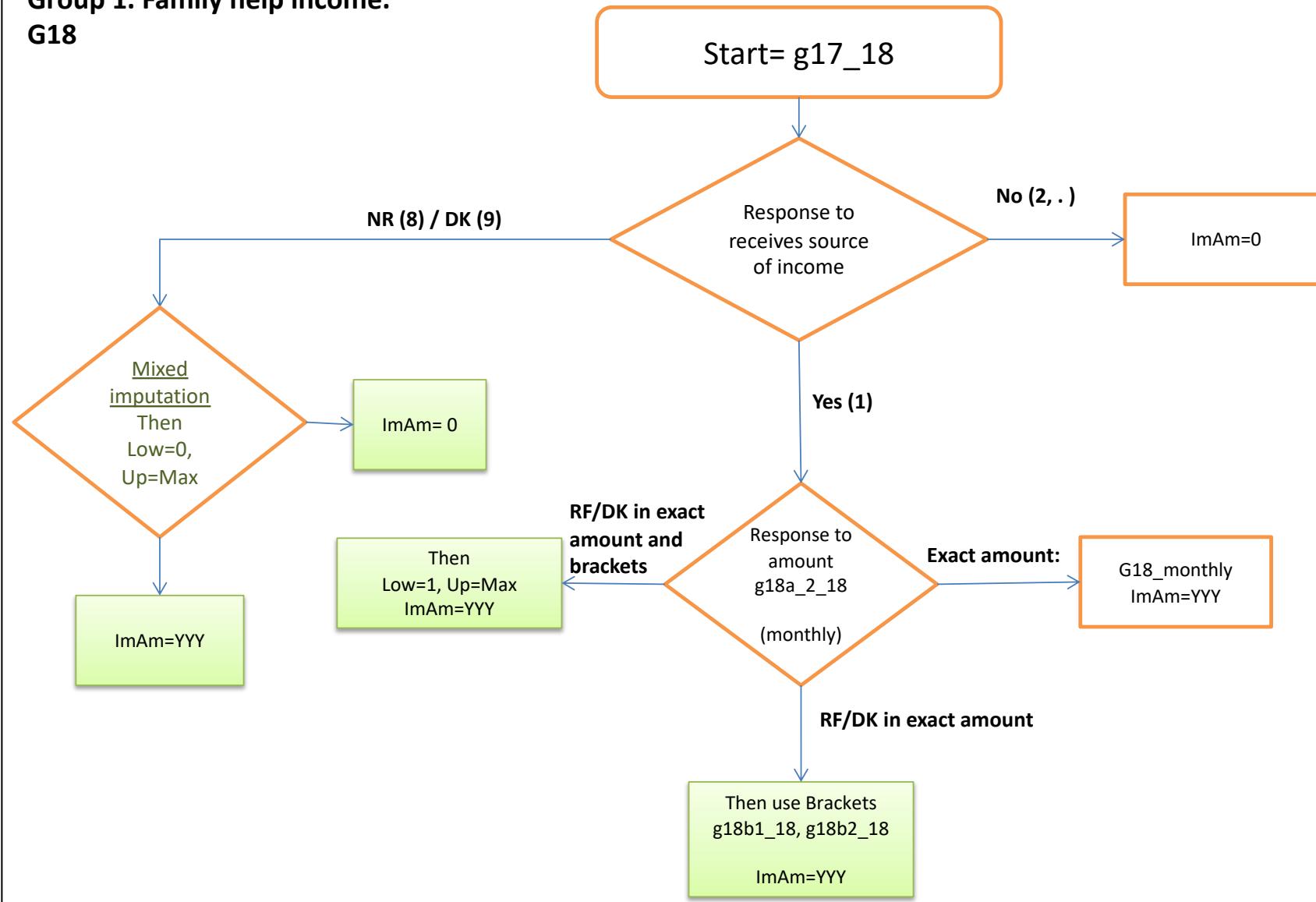
Group 1. Own transfer income-1_2
K80_1_2

Start= k79a_18

Response

No (2, 8, 9, .) → ImAm=0

Yes (1)

Response to amount k80_1_2_18

Exact amount → ImAm=YYY

(.) → ImAm=0

NR/DK in exact amount (*) → Then Low=1, Up=Max ImAm=YYY
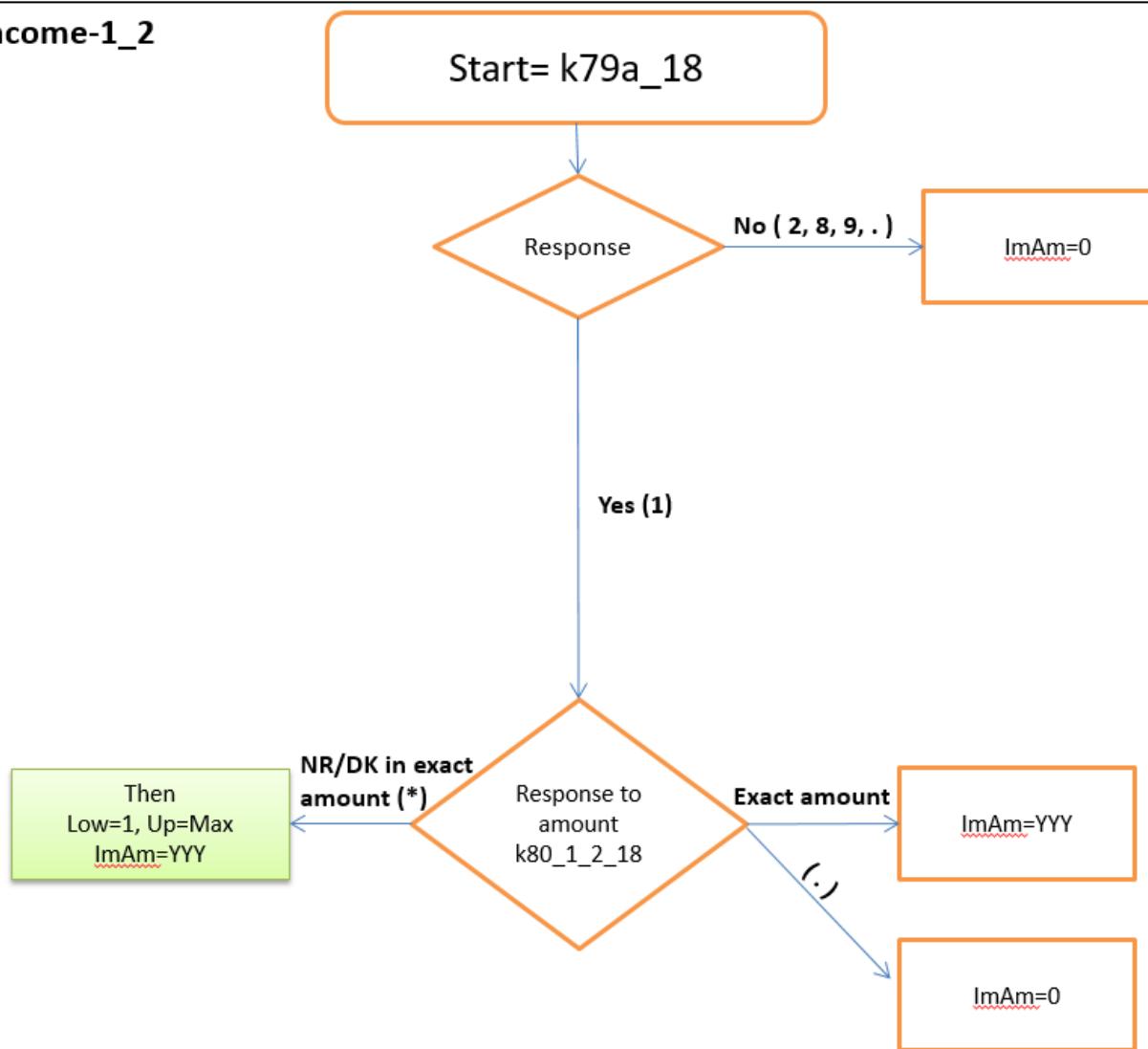
- Includes 8,88,888 etc.,
  9,99,999 etc.

Group 2. Spouse's transfer income-1_2
K83_1_2
Ex. K83_1_2

Start= k52b_18

Response → (.) → NOT impute

Go (1,2,8,9)

K82c_18 Response → No (2, .s, 8, 9) → ImAm=0

Yes (1)

Response to amount k83_1_2_18

NR/DK in exact amount (*) → Then Low=1, Up=Max ImAm=YYY

Exact amount → ImAm=YYY

(.) → ImAm=0
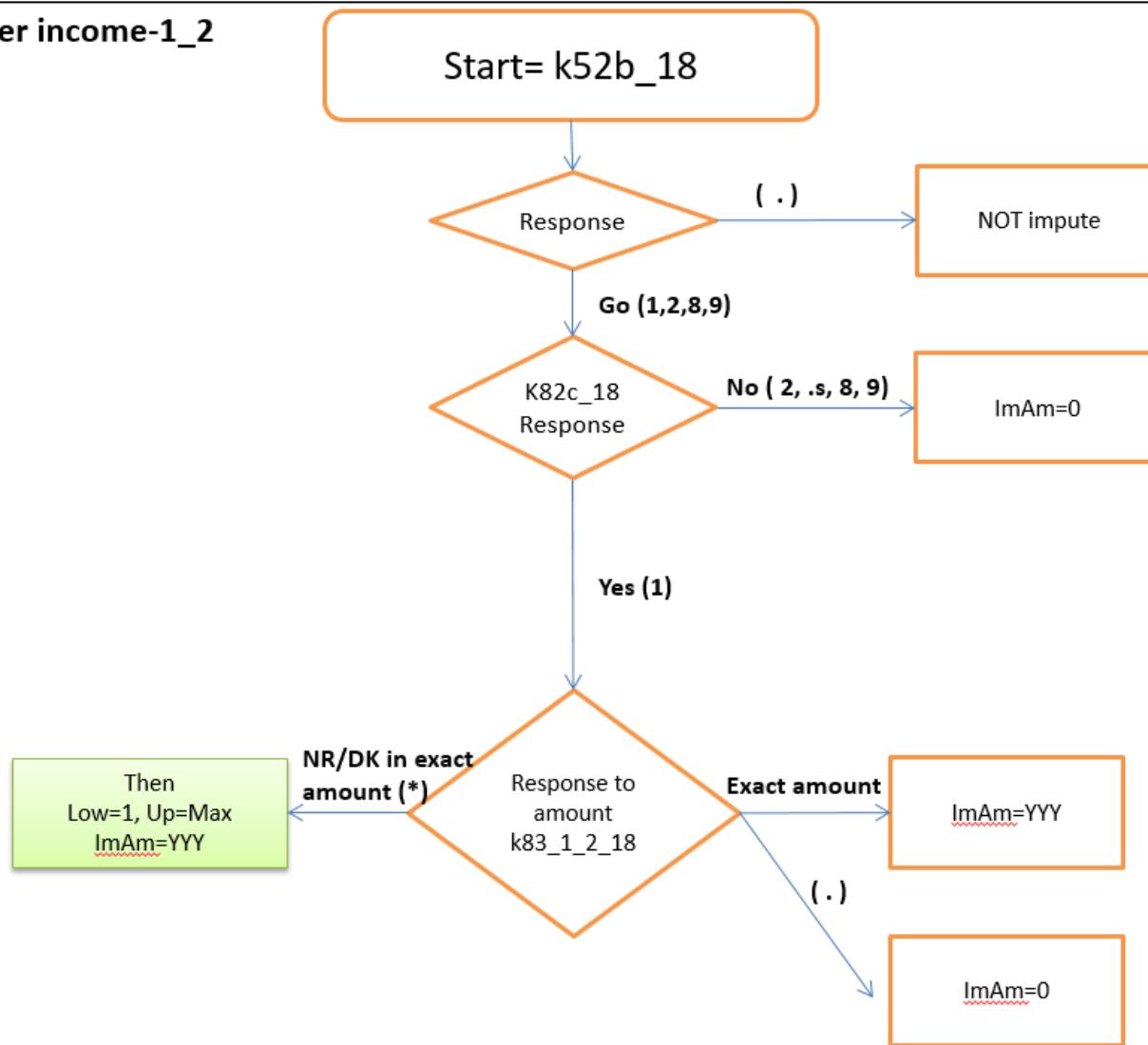
- Includes 8,88,888 etc., 9,99,999 etc.

Group 7. Help given.
G8c

Start= g7_18

Response to receives source of income

No (2, .) → ImAm=0

NR (8) / DK (9) →

Mixed imputation
Then
Low=0,
Up=Max

→ ImAm= 0

ImAm=YYY

Yes (1)

Response to amount g8c_monthly

Exact amount: → ImAm=YYY

RF/DK in exact amount and brackets →

Then
Low=1, Up=Max
ImAm=YYY

RF/DK in exact amount →

Then use Brackets
g8d1_18, g8d2_18

ImAm=YYY
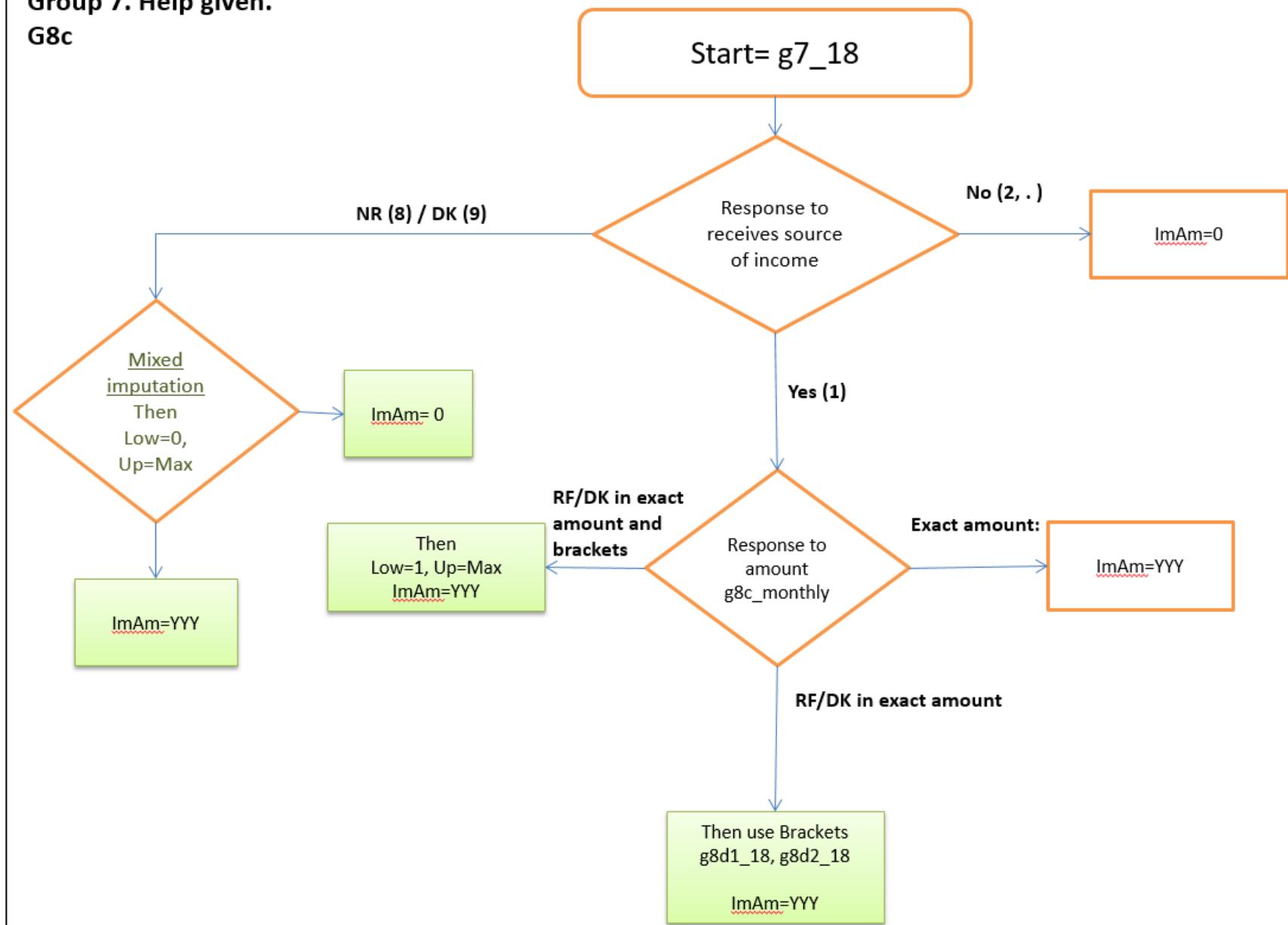
Appendix C. IVEWare Programs

Used for Imputation

GROUP 1. Respondent's Total Income Components (Own or Joint Income)

```
/*****************************************************/
/* PROGRAM NAME : Imput2018_group1_core_help.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 10/07/2020 */
/* Impute missing value on core and proxy questionnaire */
/*****************************************************/
Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;
/*
proc contents data=output.Sect_g_j_k_sa_2018;
run;
*/
data aa; set output.Sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18 ; run; *** no duplicate;
***** Core questionnaire N=10718;
/*proc freq data=aa; table tipent_hh_18; run; ****core=1, proxy=2;*/

data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
g17_18 g18a_1_18 g18a_2_18 g18_monthly g18b1_18 g18b2_18;
if tipent_hh_18 in (1);
run;
/*
proc freq data=aa2;
tables sex_18;
run;
*/
data aa2; set aa1;
imamg18_18=g18_monthly;
if g17_18 =2 and missing(g18_monthly) then imamg18_18=0;
if missing(g17_18) and missing(g18_monthly) then imamg18_18=0;
*if g17_18 in (8,9) and g18_monthly=. then imamg18_18=.;
if g17_18=1 and g18a_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamg18_18=.;
if missing(imamg18_18) and (missing(g18b1_18) or g18b1_18=8) then
g18b1_18=9;
dumg18_18=(missing(imamg18_18)); ***imputation indicator;
run;

/* proc means data=aa2 n mean std min max nmiss;
variable imamg18_18 ;
run;
proc freq data=aa2;
tables dumg18_18;
run;
*/

***** define range of imputation;
data aa3; set aa2;
```

```
if age_18 in (888, 999) then age_18=.;
lowg18=1; upg18=40000 ; ** Max=40000 ;
if g18b1_18=1 and g18b2_18=1 then do;
lowg18=500;
upg18=40000;
end;
if g18b1_18=1 and g18b2_18=2 then do;
lowg18=250; upg18=500;
end;
if g18b1_18=1 and g18b2_18=9 then do;
lowg18=250;
upg18=40000;
end;
if g18b1_18=2 then do;
lowg18=1;
upg18=250;
end;
if g18b1_18=9 then do;
lowg18=1;
upg18=40000;
end;
if g17_18 in (8,9) then lowg18=0;
if imamg18_18 >=0 then lowg18=imamg18_18;
if imamg18_18 >=0 then upg18=imamg18_18;
run;

data output.group1_core_help;
set aa3;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imamg18_18 lowg18
upg18 dumg18_18;
run;

data dd1; set output.group1_core_help;run;
/*
proc freq data=dd1;
tables yrschool;
run;
*/
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamg18_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowg18 upg18 dumg18_18;
bounds imamg18_18(<=upg18,>=lowg18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_core_help_imputed; set dd_1; drop lowg18 upg18; run;

*** check imputed amount;
proc freq data=imp.group1_core_help_imputed;
table imamg18_18;
where dumg18_18=1;
run;

*** print output: prior imputation/ without zero;
data group1;
set output.group1_core_help;
if imamg18_18=0 then imamg18_18=.;
run;

Title "Group1 core help - before imputation (mean without zero)";
proc means data=group1 n mean std min max  ;
variable imamg18_18;
run;

*** print output: prior imputation/ with zero;
Title "Group1 core help - before imputation (mean with zero)";
proc means data=output.group1_core_help n mean std min max nmiss;
variable imamg18_18 ;
run;

*** print output-imputed: mean with zero;
Title "Group1 core help - imputed (mean with zero)";
proc means n mean std min max  nmiss data=imp.group1_core_help_imputed;
var imamg18_18;
run;

*** print output-imputed: mean without zero;
data group2; set imp.group1_core_help_imputed;
if imamg18_18=0 then imamg18_18=.;
run;
Title "Group1 core help - imputed (mean without zero)";
proc means data=group2 n mean std min max ;
var imamg18_18;
run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group1_core_J36b.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 10/12/2020 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;
***** Core questionnaire N=10718;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j36a_18 j36b_18 j37a_18 j37b_18 J37c_18
;
if tipent_hh_18 in (1);
run;
proc freq; table j36a_18 j36b_18; run;

data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamj36b_18=j36b_18;
**** Imputation N=45;
*if j36a_18 =1 and missing(j36b_18) then imamj36b_18=.;
if j36a_18 =2 and missing(j36b_18) then imamj36b_18=0;
*if j36a_18 in (8,9) and missing(j36b_18)=. then imamj36b_18=.;
if j36a_18=1 and j36b_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamj36b_18=.;
if missing(imamj36b_18) and missing(j37a_18) then j37a_18=9;
dumj36b_18=1*(missing(imamj36b_18));
run;
proc freq; table imamj36b_18 j37a_18 j37b_18 J37c_18 dumj36b_18; run;
/*
proc freq data=aa2;
tables yrschool age_18;
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname  low&vname up&vname &mix1 );
set aa2;
low&vname=1; up&vname=&rmax;
if &va=1 and &vc=1 then do;
low&vname=&r1_2; up&vname=&rmax;
end;
```

```
if &va=1 and &vc=2 then do;
low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do;
low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do;
low&vname=&r2_1;
up&vname=&r1;
end;
if &va=2 and &vb=2 then do;
low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do;
low&vname=1; up&vname=&r1;
end;
if &va=9 then do;
low&vname=1; up&vname=&rmax;
end;
if imam&vname >=0 then do;
low&vname=imam&vname;
up&vname=imam&vname;
end;
if &mix1 in (8,9) then do;
low&vname=0; up&vname=&rmax;
end;
%mend range;
%range(j36b_18,j37a_18,j37b_18,j37c_18, 30000,6500,18000,2000,j36a_18); run;
/* proc freq data=aa2; table imamj36b_18;run; */

data output.group1_core_j36b;
set dataj36b_18;
by cunicah subhog_18;
run;

data dd1;
set output.group1_core_j36b;
drop j36a_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamj36b_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
```

```
lowj36b_18 upj36b_18
dumj36b_18
;
bounds
imamj36b_18 (>=lowj36b_18 ,<=upj36b_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_core_j36b_imputed;
set dd_1 ;
drop lowj36b_18 upj36b_18;
run;
/*
proc freq; table imamj36b_18; where dumj36b_18=1; run; *** n=45;
*/
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group1_core_pension.SAS */
/* PROGRAMMED BY : lU CHEN */
/* LAST UPDATEED : 11/13/2020 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

/*
proc contents data=output.sect_g_j_k_sa_2018; run;
*/

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

data bb1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k1_18
k10_1_18 k11_1_18 k12a1_18 k12b1_18 k12c1_18
k13_1_18 k14a1_18 k14b1_18 k14c1_18
k15_1_18 k16a1_18 k16b1_18 k16c1_18
K10_2_18 k11_2_18 k12a2_18 k12b2_18 k12c2_18
k13_2_18 k14a2_18 k14b2_18 k14c2_18
k15_2_18 k16a2_18 k16b2_18 k16c2_18
k26_1_18
k27_1_18 k28a1_18 k28b1_18 k28c1_18
k17_18
k29_1_18 k30a1_18 k30b1_18 k30c1_18
k31a_18 k35_1_18 k36_1_18 k37a1_18 k37b1_18 k37c1_18
k31b_18 k35_2_18 k36_2_18 k37a2_18 k37b2_18 k37c2_18
k31c_18 k35_3_18 k36_3_18 k37a3_18 k37b3_18 k37c3_18
k47_18 k47a1_18 k47b1_18 k47b2_18 k47b3_18
k48_18 k48a1_18 k48b1_18 k48b2_18 k48b3_18 k48a_monthly_18
k50_18 k50a1_18 k50b1_18 k50b2_18 k50b3_18
k51_18 k51a1_18 k51b1_18 k51b2_18 k51b3_18 k51a_monthly_18
k58a_18 k61_1_1_18 k62a1_1_18 k62b1_1_18 k62c1_1_18
k61_1_2_18 k62a1_2_18 k62b1_2_18 k62c1_2_18
k58b_18 k61_2_1_18 k62a2_1_18 k62b2_1_18 k62c2_1_18
k61_2_2_18 k62a2_2_18 k62b2_2_18 k62c2_2_18
k58c_18 k61_3_1_18 k62a3_1_18 k62b3_1_18 k62c3_1_18
k61_3_2_18 k62a3_2_18 k62b3_2_18 k62c3_2_18
k58d_18 k61_4_1_18 k62a4_1_18 k62b4_1_18 k62c4_1_18
k61_4_2_18 k62a4_2_18 k62b4_2_18 k62c4_2_18
k79a_18 k80_1_1_18 k80_1_2_18
k79c_18 k80_3_18;
if tipent_hh_18 in (1);
run;
```

```
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk11_1_18=k11_1_18; **** Imputation N=255;
if k1_18 =2 and missing(k11_1_18) then imamk11_1_18=0;
if k1_18=1 and k10_1_18=2 and missing(k11_1_18) then imamk11_1_18=0;
if k1_18=1 and k10_1_18=1 and k11_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk11_1_18=.;
if missing(imamk11_1_18) and missing(k12a1_18) then k12a1_18=9;
imamk11_2_18=k11_2_18; **** Imputation N=11;
if k1_18 in (2,8,9) and missing(k11_2_18) then imamk11_2_18=0;
if k1_18=1 and (k10_2_18=2 or missing(k10_2_18)) and missing(k11_2_18) then
imamk11_2_18=0;
if k1_18=1 and k10_2_18=1 and k11_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk11_2_18=.;
if missing(imamk11_2_18) and missing(k12a2_18) then k12a2_18=9;
imamk13_1_18=k13_1_18; **** Imputation N=271;
if k1_18 =2 and missing(k13_1_18) then imamk13_1_18=0;
if k1_18=1 and k13_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk13_1_18=.;
if missing(imamk13_1_18) and missing(k14a1_18) then k14a1_18=9;
imamk13_2_18=k13_2_18; **** Imputation N=12;
if k1_18 in (2,8,9) and missing(k13_2_18) then imamk13_2_18=0;
if k1_18=1 and k13_2_18=. then imamk13_2_18=0;
if k1_18=1 and k13_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk13_2_18=.;
if missing(imamk13_2_18) and missing(k14a2_18) then k14a2_18=9;
imamk15_1_18=k15_1_18; **** Imputation N=262;
if k1_18 =2 and missing(k15_1_18) then imamk15_1_18=0;
if k1_18=1 and k15_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk15_1_18=.;
if missing(imamk15_1_18) and missing(k16a1_18) then k16a1_18=9;
imamk15_2_18=k15_2_18; **** Imputation N=12;
if k1_18 in (2,8,9) and missing(k15_2_18) then imamk15_2_18=0;
if k1_18=1 and k15_2_18=. then imamk15_2_18=0;
if k1_18=1 and k15_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk15_2_18=.;
if missing(imamk15_2_18) and missing(k16a2_18) then k16a2_18=9;
k11_1_imp_18=1*(missing(imamk11_1_18));
k11_2_imp_18=1*(missing(imamk11_2_18));
k13_1_imp_18=1*(missing(imamk13_1_18));
k13_2_imp_18=1*(missing(imamk13_2_18));
```

```
k15_1_imp_18=1*(missing(imamk15_1_18));
k15_2_imp_18=1*(missing(imamk15_2_18));
run;

/* proc means data=bb2 n mean std min max nmiss;
variable imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18 imamk15_1_18
imamk15_2_18 ; run; */

proc freq data=bb2;
tables k15_1_18;
run;

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
imam&vname dum&vname low&vname up&vname &mix1 &mix2 );
set bb2;
low&vname=1; up&vname=&rmax;
if &va=1 and &vc=1 then do;
low&vname=&r1_2;up&vname=&rmax;
end;
if &va=1 and &vc=2 then do;
low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do;
low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do;
low&vname=&r2_1; up&vname=&r1;
end;
if &va=2 and &vb=2 then do;
low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do;
low&vname=1; up&vname=&r1;
end;
if &va=9 then do;
low&vname=1; up&vname=&rmax;
end;
if imam&vname >=0 then do;
low&vname=imam&vname;
up&vname=imam&vname;
end;
if &mix1 in (8,9) then do;
low&vname=0;
up&vname=&rmax;
end;
if &mix2 in (8,9) then do;
low&vname=0;
up&vname=&rmax;
end;
%mend range;
```

```
%range(k11_1_18,k12a1_18,k12b1_18,k12c1_18,6600000,60000,180000,20000,k1_18,
k10_1_18); run;
%range(k11_2_18,k12a2_18,k12b2_18,k12c2_18,600000,60000,180000,20000,k10_2_1
8);run;
%range(k13_1_18,k14a1_18,k14b1_18,k14c1_18,5300000,60000,180000,20000,k1_18,
k14a1_18); run; ****k14a1,k14a2 missing, then range 0-max;
%range(k13_2_18,k14a2_18,k14b2_18,k14c2_18,540000,60000,180000,20000,k14a2_1
8);run;
%range(k15_1_18,k16a1_18,k16b1_18,k16c1_18,5000000,20000,60000,7500,k1_18,k1
6a1_18);run; ****k16a1,k16a2 missing, then rang 0-max;
%range(k15_2_18,k16a2_18,k16b2_18,k16c2_18,60000,20000,60000,7500,k16a2_18);
run;


data output.group1_core_pension1;
merge datak11_1_18(drop=k1_18 k10_1_18)
datak11_2_18(drop=k10_2_18)
datak13_1_18(drop=k1_18 k14a1_18)
datak13_2_18(drop=k14a2_18)
datak15_1_18(drop=k1_18 k16a1_18)
datak15_2_18(drop=k16a2_18) ;
run;

data dd1; set output.group1_core_pension1; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18 imamk15_1_18
imamk15_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk11_1_18 upk11_1_18
lowk11_2_18 upk11_2_18
lowk13_1_18 upk13_1_18
lowk13_2_18 upk13_2_18
lowk15_1_18 upk15_1_18
lowk15_2_18 upk15_2_18
k11_1_imp_18
k11_2_imp_18
k13_1_imp_18
k13_2_imp_18
k15_1_imp_18
k15_2_imp_18
;
bounds
imamk11_1_18 (>=lowk11_1_18 ,<=upk11_1_18)
```

```
imamk11_2_18 (>=lowk11_2_18 ,<=upk11_2_18)
imamk13_1_18 (>=lowk13_1_18 ,<=upk13_1_18)
imamk13_2_18 (>=lowk13_2_18 ,<=upk13_2_18)
imamk15_1_18 (>=lowk15_1_18 ,<=upk15_1_18)
imamk15_2_18 (>=lowk15_2_18 ,<=upk15_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_core_pension1_imputed;
set dd_1;
drop lowk11_1_18 upk11_1_18
lowk11_2_18 upk11_2_18
lowk13_1_18 upk13_1_18
lowk13_2_18 upk13_2_18
lowk15_1_18 upk15_1_18
lowk15_2_18 upk15_2_18;
run;
/* data tem; set imp.group1_core_pension1_imputed;
proc freq ; table imamk11_1_18 ; where k11_1_imp_18=1; run;
proc freq; table imamk11_2_18; where k11_2_imp_18=1; run;
proc freq; table imamk13_1_18; where k13_1_imp_18 =1; run;
proc freq; table imamk13_2_18; where k13_2_imp_18 =1; run;
proc freq; table imamk15_1_18; where k15_1_imp_18 =1; run;
proc freq; table imamk15_2_18; where k15_2_imp_18 =1; run;
proc means; var imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18
imamk15_1_18
imamk15_2_18; run; */


**************** 2 **********;
proc freq data=bb2;
tables imamk29_1_18;
run;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk27_1_18=k27_1_18; **** Imputation N=50;
if k17_18=2 and missing(k27_1_18) then imamk27_1_18=0;
if k17_18=1 and k26_1_18=2 and missing(k27_1_18) then imamk27_1_18=0;
if k17_18=1 and k26_1_18=1 and k27_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk27_1_18=.;
if missing(imamk27_1_18) and missing(k28a1_18) then k28a1_18=9;
imamk29_1_18=k29_1_18; **** Imputation N=85;
if k17_18=2 and missing(k29_1_18) then imamk29_1_18=0;
```

```
if k17_18=1 and k29_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk29_1_18=.;
if missing(imamk29_1_18) and missing(k30a1_18) then k30a1_18=9;
k27_1_imp_18=1*(missing(imamk27_1_18));
k29_1_imp_18=1*(missing(imamk29_1_18));
run;

/*
proc means data=bb2;
var imamk27_1_18 imamk29_1_18;
run;

proc freq data=bb2;
tables k27_1_imp_18 k29_1_imp_18;
run;
*/
%range(k27_1_18,k28a1_18,k28b1_18,k28c1_18,125000,6000,18000,2000,k17_18,k26
_1_18);run;
%range(k29_1_18,k30a1_18,k30b1_18,k30c1_18,400000,800,2500,200,k17_18,k30a1_
18);run;

data output.group1_core_pension2;
merge
datak27_1_18(drop=k17_18 k26_1_18)
datak29_1_18(drop=k17_18 k30a1_18);
run;

data dd1; set output.group1_core_pension2; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk27_1_18 imamk29_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk27_1_18 upk27_1_18
lowk29_1_18 upk29_1_18
k27_1_imp_18
k29_1_imp_18
;
bounds
imamk27_1_18 (>=lowk27_1_18 ,<=upk27_1_18)
imamk29_1_18 (>=lowk29_1_18 ,<=upk29_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
```

```
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_core_pension2_imputed;
set dd_1;
drop lowk27_1_18 upk27_1_18
lowk29_1_18 upk29_1_18;
run;
/*
proc freq; table imamk27_1_15; where dumk27_1_15 =1; run; **** imputed;
proc freq; table imamk29_1_15; where dumk29_1_15 =1; run; **** imputed; */

**************** 3 **********;
proc freq data=bb2;
tables imamk36_3_18;
run;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk36_1_18=k36_1_18; **** Imputation N=148;
if k31a_18=2 and missing(k36_1_18) then imamk36_1_18=0;
if k31a_18=1 and k35_1_18=2 and missing(k36_1_18) then imamk36_1_18=0;
if k31a_18=1 and k35_1_18=1 and k36_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_1_18=.;
if missing(imamk36_1_18) and missing(k37a1_18) then k37a1_18=9;
imamk36_2_18=k36_2_18; **** Imputation N=23;
if k31b_18=2 and missing(k36_2_18) then imamk36_2_18=0;
if k31b_18=1 and k35_2_18=2 and missing(k36_2_18) then imamk36_2_18=0;
if k31b_18=1 and k35_2_18=1 and k36_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_2_18=.;
if missing(imamk36_2_18) and missing(k37a2_18) then k37a2_18=9;
imamk36_3_18=k36_3_18; **** Imputation N=24;
if k31c_18=2 and missing(k36_3_18) then imamk36_3_18=0;
if k31c_18=1 and k35_3_18=2 and missing(k36_3_18) then imamk36_3_18=0;
if k31c_18=1 and k35_3_18=1 and k36_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_3_18=.;
if missing(imamk36_3_18) and missing(k37a3_18) then k37a3_18=9;
k36_1_imp_18=1*(missing(imamk36_1_18));
k36_2_imp_18=1*(missing(imamk36_2_18));
k36_3_imp_18=1*(missing(imamk36_3_18));
run;
/* proc freq data=bb2; table k31b_15 k35_2_15 k36_2_15 k37a2_15; run;
proc print data=bb2; var k31a_18 k35_1_18 k36_1_18 k37a1_18; where
k36_1_imp_18=1;
run;
```

```
proc print data=bb2; var k31b_18 k35_2_18 k36_2_18 k37a2_18; where
k36_2_imp_18=1;
run;
proc print data=bb2; var k31c_18 k35_3_18 k36_3_18 k37a3_18; where
k36_3_imp_18=1;
run;
proc freq data=bb2;
tables k36_1_imp_18 k36_2_imp_18 k36_3_imp_18;
run;
*/

proc means data=bb2;
var imamk36_1_18 imamk36_2_18 imamk36_3_18;
run;

%range(k36_1_18,k37a1_18,k37b1_18,k37c1_18,600000,400,2000,200,k31a_18,k35_1
_18);run;
%range(k36_2_18,k37a2_18,k37b2_18,k37c2_18,89893,400,2000,200,k31b_18,k35_2_
18);run;
%range(k36_3_18,k37a3_18,k37b3_18,k37c3_18,750000,400,2000,200,k31c_18,k35_3
_18);run;

data output.group1_core_pension3;
merge datak36_1_18 datak36_2_18 datak36_3_18 ;
run;

data dd1;
set output.group1_core_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_1_18 upk36_1_18
k36_1_imp_18
imamk36_1_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk36_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_1_18 upk36_1_18
k36_1_imp_18
;
bounds
imamk36_1_18 (>=lowk36_1_18 ,<=upk36_1_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;


/* proc print ; var k36_1_imp_18 lowk36_1_18 upk36_1_18;
where k36_1_imp_18=1; run; */

data dd1;
set output.group1_core_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_2_18 upk36_2_18
k36_2_imp_18
imamk36_2_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk36_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_2_18 upk36_2_18
k36_2_imp_18
;
bounds
imamk36_2_18 (>=lowk36_2_18 ,<=upk36_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

/*
proc print ;
var k36_2_imp_18 lowk36_2_18 upk36_2_18;
where k36_2_imp_18=1;
run;
```

```
*/
/*
proc print data=bb2;
var k31b_18 k36_2_18 k37a2_18 k37b2_18 k37c2_18;
where k36_2_imp_18=1;
run;
*/

data dd1;
set output.group1_core_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_3_18 upk36_3_18
k36_3_imp_18
imamk36_3_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk36_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_3_18 upk36_3_18
k36_3_imp_18
;
bounds
imamk36_3_18 (>=lowk36_3_18 ,<=upk36_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

/*
proc print ;
var k36_3_imp_18 lowk36_3_18 upk36_3_18;
where k36_3_imp_18=1;
run;
*/
/*
proc print data=bb2;
var k31c_18 k36_3_18 k37a3_18 k37b3_18 k37c3_18;
```

```
where k36_3_imp_18=1;
run;
*/

data data imp.group1_core_pension3_imputed;
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop lowk36_1_18 upk36_1_18
lowk36_2_18 upk36_2_18
lowk36_3_18 upk36_3_18;
run;

***************** 4 ******************;
/*
proc freq data=bb2;
tables imamk48_18;
run;

proc print data=bb2;
var k48_18 k48a_monthly_18 k48a1_18;
where missing(imamk48_18);
run;*/

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk47_18=k47a1_18; **** Imputation N=91;
if k47_18 = 2 and missing(k47a1_18) then imamk47_18=0;
if missing(k47_18) and missing(k47a1_18) then imamk47_18=0;
if k47_18 = 1 and k47a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk47_18=.;
if missing(imamk47_18) and missing(k47b1_18) then k47b1_18=9;
imamk48_18=k48a_monthly_18; **** Imputation N=102;
if k48_18 = 2 and missing(k48a_monthly_18) then imamk48_18=0;
if missing(k48_18) and missing(k48a_monthly_18) then imamk48_18=0;
*if k48_18 = 1 and k48a_monthly_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk48_18=.;
if k48_18 = 1 and k48a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk48_18=.;
if missing(imamk48_18) and missing(k48b1_18) then k48b1_18=9;
imamk50_18=k50a1_18; **** Imputation N=4;
if k50_18 = 2 and missing(k50a1_18) then imamk50_18=0;
if missing(k50_18) and missing(k50a1_18) then imamk50_18=0;
if k50_18 = 1 and k50a1_18
in(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999
999) then imamk50_18=.;
if missing(imamk50_18) and missing(k50b1_18) then k50b1_18=9;
imamk51_18=k51a_monthly_18; **** Imputation N=2;
if k51_18 =2 and missing(k51a_monthly_18) then imamk51_18=0;
if missing(k51_18) and missing(k51a_monthly_18) then imamk51_18=0;
```

```
if k51_18 =1 and k51a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk51_18=.;
if missing(imamk51_18) and missing(k51b1_18) then k51b1_18=9;
dumk47_18=1*(missing(imamk47_18));
dumk48_18=1*(missing(imamk48_18));
dumk50_18=1*(missing(imamk50_18));
dumk51_18=1*(missing(imamk51_18));
run;
/*
proc freq data=bb2;
tables dumk47_18 dumk48_18 dumk50_18 dumk51_18;
run;
proc means data=bb2;
var imamk47_18 imamk48_18 imamk50_18 imamk51_18;
run;
*/

%range(k47_18,k47b1_18,k47b2_18,k47b3_18, 800000,7500,15000,2000,k47_18);
run;
%range(k48_18,k48b1_18,k48b2_18,k48b3_18, 100000,7500,15000,2000,k48_18);
run;
%range(k50_18,k50b1_18,k50b2_18,k50b3_18, 140000,7500,15000,2000,k50_18);
run;
%range(k51_18,k51b1_18,k51b2_18,k51b3_18, 100000,7500,15000,2000,k51_18);
run; *max=3333.33 < upper range of the bracket(15000), and max of k57(2nd
job bonus from spouse) is also <15000, so use bonus from primary job as
refernce;

/*
proc print data=Datak51_18; var cunicah lowk51_18 upk51_18; where
dumk51_18=1;
run;
proc print data=bb2;  where cunicah=14785;
run;
*/

data output.group1_core_pension4;
merge
datak47_18(drop=k47_18)
datak48_18(drop=k48_18)
datak50_18(drop=k50_18)
datak51_18(drop=k51_18);
by cunicah subhog_18;
run;

data dd1; set output.group1_core_pension4; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
```

```
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk47_18 imamk48_18 imamk50_18 imamk51_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk47_18 upk47_18
lowk48_18 upk48_18
lowk50_18 upk50_18
lowk51_18 upk51_18
dumk47_18
dumk48_18
dumk50_18
dumk51_18
;
bounds
imamk47_18 (>=lowk47_18 ,<=upk47_18)
imamk48_18 (>=lowk48_18 ,<=upk48_18)
imamk50_18 (>=lowk50_18 ,<=upk50_18)
imamk51_18 (>=lowk51_18 ,<=upk51_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_core_pension4_imputed;
set dd_1;
drop lowk47_18 upk47_18
lowk48_18 upk48_18
lowk50_18 upk50_18
lowk51_18 upk51_18;
run;

/* data temp; set imp.group1_core_pension4_imputed; run;
proc freq; table imamk47_18; where dumk47_18 =1 ; run; *** imputed;
proc freq; table imamk48_18; where dumk48_18 =1; run; *** imputed;
proc freq; table imamk50_18; where dumk50_18 =1; run; *** imputed;
proc freq; table imamk51_18; where dumk51_18 =1; run; *** imputed; */


********* 5 *********;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk61_1_1_18=k61_1_1_18;**** Imputation N=148;
if k58a_18 =2 and missing(k61_1_1_18) then imamk61_1_1_18=0;
```

```
if missing(k58a_18) and missing(k61_1_1_18) then imamk61_1_1_18=0;
if k58a_18=1 and k61_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_1_1_18=.;
if missing(imamk61_1_1_18) and missing(k62a1_1_18) then k62a1_1_18=9;
imamk61_1_2_18=k61_1_2_18;**** Imputation N=12;
if k58a_18 in (2,8,9) and missing(k61_1_2_18) then imamk61_1_2_18=0;
if missing(k58a_18) and missing(k61_1_2_18) then imamk61_1_2_18=0;
if k58a_18 =1 and k61_1_2_18=. then imamk61_1_2_18=0;
if k58a_18=1 and k61_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_1_2_18=.;
if missing(imamk61_1_2_18) and missing(k62a1_2_18) then k62a1_2_18=9;
imamk61_2_1_18=k61_2_1_18;**** Imputation N=51;
if k58b_18 =2 and missing(k61_2_1_18) then imamk61_2_1_18=0;
if missing(k58b_18) and missing(k61_2_1_18) then imamk61_2_1_18=0;
if k58b_18=1 and k61_2_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_2_1_18=.;
if missing(imamk61_2_1_18) and missing(k62a2_1_18) then k62a2_1_18=9;
imamk61_2_2_18=k61_2_2_18;**** Imputation N=4;
if k58b_18 in (2,8,9) and missing(k61_2_2_18) then imamk61_2_2_18=0;
if missing(k58b_18) and missing(k61_2_2_18) then imamk61_2_2_18=0;
if k58b_18 =1 and k61_2_2_18=. then imamk61_2_2_18=0;
if k58b_18=1 and k61_2_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_2_2_18=.;
if missing(imamk61_2_2_18) and missing(k62a2_2_18) then k62a2_2_18=9;
imamk61_3_1_18=k61_3_1_18;**** Imputation N=18;
if k58c_18 =2 and missing(k61_3_1_18) then imamk61_3_1_18=0;
if missing(k58c_18) and missing(k61_3_1_18) then imamk61_3_1_18=0;
if k58c_18=1 and k61_3_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_3_1_18=.;
if missing(imamk61_3_1_18) and missing(k62a3_1_18) then k62a3_1_18=9;
imamk61_3_2_18=k61_3_2_18;**** Imputation N=0;
if k58c_18 in (2,8,9) and missing(k61_3_2_18) then imamk61_3_2_18=0;
if missing(k58c_18) and missing(k61_3_2_18) then imamk61_3_2_18=0;
if k58c_18 =1 and k61_3_2_18=. then imamk61_3_2_18=0;
if k58c_18=1 and k61_3_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_3_2_18=.;
if missing(imamk61_3_2_18) and missing(k62a3_2_18) then k62a3_2_18=9;
imamk61_4_1_18=k61_4_1_18;**** Imputation N=15;
if k58d_18 =2 and missing(k61_4_1_18) then imamk61_4_1_18=0;
if missing(k58d_18) and missing(k61_4_1_18) then imamk61_4_1_18=0;
if k58d_18=1 and k61_4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_4_1_18=.;
if missing(imamk61_4_1_18) and missing(k62a4_1_18) then k62a4_1_18=9;
imamk61_4_2_18=k61_4_2_18;**** Imputation N=0;
if k58d_18 in (2,8,9) and missing(k61_4_2_18) then imamk61_4_2_18=0;
```

```
if missing(k58d_18) and missing(k61_4_2_18) then imamk61_4_2_18=0;
if k58d_18 =1 and k61_4_2_18=. then imamk61_4_2_18=0;
if k58d_18=1 and k61_4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_4_2_18=.;
if missing(imamk61_4_2_18) and missing(k62a4_2_18) then k62a4_2_18=9;
k61_1_1_imp_18=1*(missing(imamk61_1_1_18));
k61_1_2_imp_18=1*(missing(imamk61_1_2_18));
k61_2_1_imp_18=1*(missing(imamk61_2_1_18));
k61_2_2_imp_18=1*(missing(imamk61_2_2_18));
k61_3_1_imp_18=1*(missing(imamk61_3_1_18));
k61_3_2_imp_18=1*(missing(imamk61_3_2_18));
k61_4_1_imp_18=1*(missing(imamk61_4_1_18));
k61_4_2_imp_18=1*(missing(imamk61_4_2_18));
run;
/*
proc freq data=bb2;
tables k61_1_1_imp_18 k61_1_2_imp_18 k61_2_1_imp_18 k61_2_2_imp_18
k61_3_1_imp_18 k61_3_2_imp_18 k61_4_1_imp_18 k61_4_2_imp_18;
run;
proc means data=bb2 max;
var imamk61_1_1_18 imamk61_1_2_18 imamk61_2_1_18 imamk61_2_2_18
imamk61_3_1_18 imamk61_3_2_18 imamk61_4_1_18 imamk61_4_2_18;
run;
*/
%range(k61_1_1_18,k62a1_1_18,k62b1_1_18,k62c1_1_18,
300000,2000,7500,950,k58a_18);run;
%range(k61_1_2_18,k62a1_2_18,k62b1_2_18,k62c1_2_18, 50000,2000,7500,950);
run;
%range(k61_2_1_18,k62a2_1_18,k62b2_1_18,k62c2_1_18,
88000,2000,7500,950,k58b_18);run;
%range(k61_2_2_18,k62a2_2_18,k62b2_2_18,k62c2_2_18, 8500,2000,7500,950);
run;
%range(k61_3_1_18,k62a3_1_18,k62b3_1_18,k62c3_1_18,
28000,2000,7500,950,k58c_18);run;
%range(k61_3_2_18,k62a3_2_18,k62b3_2_18,k62c3_2_18, 0,2000,7500,950); run;/*
no observation ; */
%range(k61_4_1_18,k62a4_1_18,k62b4_1_18,k62c4_1_18,
45000,2000,7500,950,k58d_18);run;
%range(k61_4_2_18,k62a4_2_18,k62b4_2_18,k62c4_2_18, 2500,2000,7500,950);
run;/* no observation ; */

data output.group1_core_pension5;
merge
datak61_1_1_18(drop=k58a_18) datak61_1_2_18
datak61_2_1_18(drop=k58b_18) datak61_2_2_18
datak61_3_1_18(drop=k58c_18) datak61_3_2_18
datak61_4_1_18(drop=k58d_18) datak61_4_2_18;
by cunicah subhog_18;
run;


****** run P5 section 1 - output dd_1;
```

```
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_1_1_18 yrschool
lowk61_1_1_18 upk61_1_1_18
k61_1_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_1_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_1_1_18
upk61_1_1_18
k61_1_1_imp_18
;
bounds
imamk61_1_1_18 (>=lowk61_1_1_18 ,<=upk61_1_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 1 - output dd_2;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_1_2_18 yrschool
lowk61_1_2_18 upk61_1_2_18
k61_1_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
```

```
mixed imamk61_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_1_2_18
upk61_1_2_18
k61_1_2_imp_18
;
bounds
imamk61_1_2_18 (>=lowk61_1_2_18 ,<=upk61_1_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_core_pension5_imputed1; merge dd_1 dd_2; by cunicah
subhog_18;
drop lowk61_1_1_18 upk61_1_1_18
lowk61_1_2_18 upk61_1_2_18 ;
run;
proc freq; table imamk61_1_1_18; where k61_1_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_1_2_18; where k61_1_2_imp_18 =1; run; *** imputed;

****** run P5 section 2 - output dd_1;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_2_1_18 yrschool
lowk61_2_1_18 upk61_2_1_18
k61_2_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_2_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_2_1_18
upk61_2_1_18
k61_2_1_imp_18
;
bounds
imamk61_2_1_18 (>=lowk61_2_1_18 ,<=upk61_2_1_18)
yrschool(<=22, >=0)
```

```
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 2 - output dd_2;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_2_2_18 yrschool
lowk61_2_2_18 upk61_2_2_18
k61_2_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk61_2_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_2_2_18
upk61_2_2_18
k61_2_2_imp_18
;
bounds
imamk61_2_2_18 (>=lowk61_2_2_18 ,<=upk61_2_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_core_pension5_imputed2;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_2_1_18 upk61_2_1_18
lowk61_2_2_18 upk61_2_2_18 ;
run;
proc freq; table imamk61_2_1_18; where k61_2_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_2_2_18; where k61_2_2_imp_18 =1; run; *** imputed;
```

```
****** run P5 section 3 - output dd_1;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_3_1_18 yrschool
lowk61_3_1_18 upk61_3_1_18
k61_3_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_3_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_3_1_18
upk61_3_1_18
k61_3_1_imp_18
;
bounds
imamk61_3_1_18 (>=lowk61_3_1_18 ,<=upk61_3_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 3 - output dd_2;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_3_2_18 yrschool
lowk61_3_2_18 upk61_3_2_18
k61_3_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
```

```
count age_18;
mixed imamk61_3_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_3_2_18
upk61_3_2_18
k61_3_2_imp_18
;
bounds
imamk61_3_2_18 (>=lowk61_3_2_18 ,<=upk61_3_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_core_pension5_imputed3;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_3_1_18 upk61_3_1_18
lowk61_3_2_18 upk61_3_2_18 ;
run;
proc freq; table imamk61_3_1_18; where k61_3_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_3_2_18; where k61_3_2_imp_18 =1; run; *** imputed;



****** run P5 section 4 - output dd_1;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_4_1_18 yrschool
lowk61_4_1_18 upk61_4_1_18
k61_4_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_4_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_4_1_18
upk61_4_1_18
k61_4_1_imp_18
;
```

```
bounds
imamk61_4_1_18 (>=lowk61_4_1_18 ,<=upk61_4_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 4 - output dd_2;
data dd1;
set output.group1_core_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_4_2_18 yrschool
lowk61_4_2_18 upk61_4_2_18
k61_4_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk61_4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_4_2_18
upk61_4_2_18
k61_4_2_imp_18
;
bounds
imamk61_4_2_18 (>=lowk61_4_2_18 ,<=upk61_4_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_core_pension5_imputed4;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_4_1_18 upk61_4_1_18
lowk61_4_2_18 upk61_4_2_18 ;
run;
```

```
proc freq; table imamk61_4_1_18; where k61_4_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_4_2_18; where k61_4_2_imp_18 =1; run; *** imputed;

********** 6 *******************;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk80_1_1_18=k80_1_1_18; **** Imputation N=81;
if k79a_18 =2 and missing(k80_1_1_18) then imamk80_1_1_18=0; *N=8099;
if missing(k79a_18) and missing(k80_1_1_18) then imamk80_1_1_18=0; *N=0;
if k79a_18=1 and k80_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk80_1_1_18=.; *N=63;
imamk80_3_18=k80_3_18; **** Imputation N=33;
if k79c_18 =2 and missing(k80_3_18) then imamk80_3_18=0;*N=10600;
if missing(k79c_18) and missing(k80_3_18) then imamk80_3_18=0; *N=0;
if k79c_18=1 and k80_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9,9999998) then imamk80_3_18=.; *N=11;
imamk80_1_2_18=k80_1_2_18; **** Imputation N=21;
if k79a_18 in (2, 8, 9) and missing(k80_1_2_18) then imamk80_1_2_18=0;
*N=8117;
if missing(k79a_18) and missing(k80_1_2_18) then imamk80_1_2_18=0; *N=0;
if k79a_18=1 and k80_1_2_18=. then imamk80_1_2_18=0; *N=2377;
if k79a_18=1 and k80_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk80_1_2_18=.; *N=21;
k80_1_1_imp_18=missing(imamk80_1_1_18);
k80_1_2_imp_18=missing(imamk80_1_2_18);
k80_3_imp_18=missing(imamk80_3_18);
run;
/*
proc freq data=bb2;
tables k80_1_1_imp_18 k80_1_2_imp_18 k80_3_imp_18;
run;
proc means data=bb2;
var imamk80_1_1_18 imamk80_1_2_18 imamk80_3_18;
run;
*/
data datak80; set bb2
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imamk80_1_1_18
imamk80_1_2_18 imamk80_3_18 k79a_18 k79c_18 k80_1_1_imp_18 k80_1_2_imp_18
k80_3_imp_18);
lowk80_1_1_18=1; upk80_1_1_18=20000;
if k79a_18 in (8,9) then lowk80_1_1_18=0;
lowk80_1_2_18=1; upk80_1_2_18=20000;
lowk80_3_18=1; upk80_3_18=4000000;
if k79c_18 in (8,9) then lowk80_3_18=0;
if imamk80_1_1_18 >=0 then do;
lowk80_1_1_18=imamk80_1_1_18;upk80_1_1_18=imamk80_1_1_18; end;
if imamk80_1_2_18 >=0 then do; lowk80_1_2_18=imamk80_1_2_18;
upk80_1_2_18=imamk80_1_2_18; end;
```

```
if imamk80_3_18 >=0 then do; lowk80_3_18=imamk80_3_18;
upk80_3_18=imamk80_3_18; end;
run;

data output.group1_core_pension6;
set datak80(drop=k79a_18 k79c_18);
run;

data dd1; set output.group1_core_pension6; **** Core nonproxy N=10718
var=14;
keep cunicah subhog_18 tipent_hh_18
sex_18 age_18 yrschool
imamk80_1_1_18 lowk80_1_1_18 upk80_1_1_18 k80_1_1_imp_18
imamk80_1_2_18 lowk80_1_2_18 upk80_1_2_18 k80_1_2_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk80_1_1_18 imamk80_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk80_1_1_18 upk80_1_1_18
lowk80_1_2_18 upk80_1_2_18
k80_1_1_imp_18
k80_1_2_imp_18
;
bounds
imamk80_1_1_18 (>=lowk80_1_1_18 ,<=upk80_1_1_18)
imamk80_1_2_18 (>=lowk80_1_2_18 ,<=upk80_1_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group1_core_pension6;
keep cunicah subhog_18 tipent_hh_18
sex_18 age_18 yrschool
imamk80_3_18 lowk80_3_18 upk80_3_18 k80_3_imp_18 ;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk80_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk80_3_18 upk80_3_18
k80_3_imp_18
;
bounds
imamk80_3_18 (>=lowk80_3_18 ,<=upk80_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_core_pension6_imputed; merge dd_1 dd_2; by cunicah
subhog_18;
drop lowk80_1_1_18 upk80_1_1_18
lowk80_1_2_18 upk80_1_2_18
lowk80_3_18 upk80_3_18 ;
run;

proc freq; table imamk80_1_1_18; where k80_1_1_imp_18 =1; run;
proc freq; table imamk80_1_2_18; where k80_1_2_imp_18 =1; run;
proc freq; table imamk80_3_18; where k80_3_imp_18 =1; run;
```

```
/******************************************************/
/* PROGRAM NAME : Imput2018_group1_proxy_J36b.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 11/13/2020 */
/* Impute missing value on core and proxy questionnaire */
/******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** Proxy questionnaire N=683;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j36a_18 j36b_18 j37a_18 j37b_18 J37c_18
;
if tipent_hh_18 in (2);
run;

/*proc freq; table j36a_18 j36b_18; run;*/

data aa2; set aa1;
imamj36b_18=j36b_18;**** Imputation N=5;
if j36a_18 =2 and missing(j36b_18) then imamj36b_18=0;
if j36a_18=1 and j36b_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamj36b_18=.;
if missing(imamj36b_18) and missing(j37a_18) then j37a_18=9;
dumj36b_18=1*(missing(imamj36b_18));
run;

/*proc freq; table imamj36b_18 j37a_18 j37b_18 J37c_18 dumj36b_18; run;*/
/*proc means data=aa2; var imamj36b_18;run;*/

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname  low&vname up&vname &mix1 );
set aa2;
low&vname=1; up&vname=&rmax;
if &va=1 and &vc=1 then do;
low&vname=&r1_2; up&vname=&rmax;
end;
if &va=1 and &vc=2 then do;
low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do;
```

```
low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do;
low&vname=&r2_1;
up&vname=&r1;
end;
if &va=2 and &vb=2 then do;
low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do;
low&vname=1; up&vname=&r1;
end;
if &va=9 then do;
low&vname=1; up&vname=&rmax;
end;
if imam&vname >=0 then do;
low&vname=imam&vname;
up&vname=imam&vname;
end;
if &mix1 in (8,9) then do;
low&vname=0; up&vname=&rmax;
end;
%mend range;
%range(j36b_18,j37a_18,j37b_18,j37c_18, 30000,6500,18000,2000,j36a_18); run;

data output.group1_proxy_j36b;
set dataj36b_18;
by cunicah subhog_18; run;

data dd1; set output.group1_proxy_j36b; **** proxy N=683 var=10;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj36b_18
lowj36b_18 upj36b_18
dumj36b_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamj36b_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj36b_18 upj36b_18
dumj36b_18
;
```

```
bounds
imamj36b_18 (>=lowj36b_18 ,<=upj36b_18)
yrschool(<=22, >=0)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_proxy_j36b_imputed;
set dd_1 ;
drop
lowj36b_18 upj36b_18
;
run;
/*
proc freq; table imamj36b_18; where dumj36b_18=1; run; *** n=5;
*/

*** print putput: prior imputation;
Title "Group 1 proxy J36b - before imputation (mean with zero)";
proc means data=output.Group1_proxy_J36b mean std min max n nmiss;
variable imamj36b_15 ; run;
Title "Group 1 proxy J36b - before imputation (mean without zero)";
data group1; set output.Group1_proxy_J36b;
if imamj36b_15 =0 then imamj36b_15 =.;
run;
proc means data=group1 mean std min max n nmiss ;
var imamj36b_15 ; run;

*** print putput: mean with zero;
Title "Group 1 proxy J36b - imputed (mean with zero)";
proc means mean std min max n nmiss data=imp.Group1_proxy_J36b_imputed;
var imamj36b_15 ;
run;
*** print output: mean without zero;
data group2; set imp.Group1_proxy_J36b_imputed;
if imamj36b_15 =0 then imamj36b_15 =.;
run;
Title "Group 1 proxy J36b - imputed (mean without zero)";
proc means data=group2 mean std min max n nmiss ;
var imamj36b_15 ; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group1_proxy_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 12/14/2020 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/


Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;


/*
proc contents data=output.sect_g_j_k_sa_2018; run;
*/


data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;


***** proxy questionnaire N=683;
data bb1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k1_18
k10_1_18 k11_1_18 k12a1_18 k12b1_18 k12c1_18
k13_1_18 k14a1_18 k14b1_18 k14c1_18
k15_1_18 k16a1_18 k16b1_18 k16c1_18
K10_2_18 k11_2_18 k12a2_18 k12b2_18 k12c2_18
k13_2_18 k14a2_18 k14b2_18 k14c2_18
k15_2_18 k16a2_18 k16b2_18 k16c2_18
k26_1_18
k27_1_18 k28a1_18 k28b1_18 k28c1_18
k17_18
k29_1_18 k30a1_18 k30b1_18 k30c1_18
k31a_18 k35_1_18 k36_1_18 k37a1_18 k37b1_18 k37c1_18
k31b_18 k35_2_18 k36_2_18 k37a2_18 k37b2_18 k37c2_18
k31c_18 k35_3_18 k36_3_18 k37a3_18 k37b3_18 k37c3_18
k47_18 k47a1_18 k47b1_18 k47b2_18 k47b3_18
k48_18 k48a1_18 k48b1_18 k48b2_18 k48b3_18 k48a_monthly_18
k50_18 k50a1_18 k50b1_18 k50b2_18 k50b3_18
k51_18 k51a1_18 k51b1_18 k51b2_18 k51b3_18 k51a_monthly_18
k58a_18 k61_1_1_18 k62a1_1_18 k62b1_1_18 k62c1_1_18
k61_1_2_18 k62a1_2_18 k62b1_2_18 k62c1_2_18
k58b_18 k61_2_1_18 k62a2_1_18 k62b2_1_18 k62c2_1_18
k61_2_2_18 k62a2_2_18 k62b2_2_18 k62c2_2_18
k58c_18 k61_3_1_18 k62a3_1_18 k62b3_1_18 k62c3_1_18
k61_3_2_18 k62a3_2_18 k62b3_2_18 k62c3_2_18
k58d_18 k61_4_1_18 k62a4_1_18 k62b4_1_18 k62c4_1_18
k61_4_2_18 k62a4_2_18 k62b4_2_18 k62c4_2_18
k79a_18 k80_1_1_18 k80_1_2_18
k79c_18 k80_3_18;
if tipent_hh_18 in (2);
run;
```

```
***************** 1 *********;
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk11_1_18=k11_1_18; **** Imputation N=12;
if k1_18 =2 and missing(k11_1_18) then imamk11_1_18=0;
if k1_18=1 and k10_1_18=2 and missing(k11_1_18) then imamk11_1_18=0;
if k1_18=1 and k10_1_18=1 and k11_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk11_1_18=.;
if missing(imamk11_1_18) and missing(k12a1_18) then k12a1_18=9;
imamk11_2_18=k11_2_18; **** Imputation N=2;
if k1_18 in (2,8,9) and missing(k11_2_18) then imamk11_2_18=0;
if k1_18=1 and (k10_2_18=2 or missing(k10_2_18)) and missing(k11_2_18) then
imamk11_2_18=0;
if k1_18=1 and k10_2_18=1 and k11_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk11_2_18=.;
if missing(imamk11_2_18) and missing(k12a2_18) then k12a2_18=9;
imamk13_1_18=k13_1_18; **** Imputation N=10;
if k1_18 =2 and missing(k13_1_18) then imamk13_1_18=0;
if k1_18=1 and k13_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk13_1_18=.;
if missing(imamk13_1_18) and missing(k14a1_18) then k14a1_18=9;
imamk13_2_18=k13_2_18; **** Imputation N=2;
if k1_18 in (2,8,9) and missing(k13_2_18) then imamk13_2_18=0;
if k1_18=1 and k13_2_18=. then imamk13_2_18=0;
if k1_18=1 and k13_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk13_2_18=.;
if missing(imamk13_2_18) and missing(k14a2_18) then k14a2_18=9;
imamk15_1_18=k15_1_18; **** Imputation N=14;
if k1_18 =2 and missing(k15_1_18) then imamk15_1_18=0;
if k1_18=1 and k15_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk15_1_18=.;
if missing(imamk15_1_18) and missing(k16a1_18) then k16a1_18=9;
imamk15_2_18=k15_2_18; **** Imputation N=1;
if k1_18 in (2,8,9) and missing(k15_2_18) then imamk15_2_18=0;
if k1_18=1 and k15_2_18=. then imamk15_2_18=0;
if k1_18=1 and k15_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then
imamk15_2_18=.;
if missing(imamk15_2_18) and missing(k16a2_18) then k16a2_18=9;
k11_1_imp_18=1*(missing(imamk11_1_18));
k11_2_imp_18=1*(missing(imamk11_2_18));
```

```
k13_1_imp_18=1*(missing(imamk13_1_18));
k13_2_imp_18=1*(missing(imamk13_2_18));
k15_1_imp_18=1*(missing(imamk15_1_18));
k15_2_imp_18=1*(missing(imamk15_2_18));
run;
/*
proc freq data=bb2;
tables k11_1_imp_18 k11_2_imp_18 k13_1_imp_18 k13_2_imp_18 k15_1_imp_18
k15_2_imp_18;
run;
*/
/* proc means data=bb2 n mean std min max nmiss;
variable imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18 imamk15_1_18
imamk15_2_18 ; run; */

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
imam&vname dum&vname low&vname up&vname &mix1 &mix2 );
set bb2;
low&vname=1; up&vname=&rmax;
if &va=1 and &vc=1 then do;
low&vname=&r1_2;up&vname=&rmax;
end;
if &va=1 and &vc=2 then do;
low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do;
low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do;
low&vname=&r2_1; up&vname=&r1;
end;
if &va=2 and &vb=2 then do;
low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do;
low&vname=1; up&vname=&r1;
end;
if &va=9 then do;
low&vname=1; up&vname=&rmax;
end;
if imam&vname >=0 then do;
low&vname=imam&vname;
up&vname=imam&vname;
end;
if &mix1 in (8,9) then do;
low&vname=0;
up&vname=&rmax;
end;
if &mix2 in (8,9) then do;
low&vname=0;
```

```
up&vname=&rmax;
end;
%mend range;
%range(k11_1_18,k12a1_18,k12b1_18,k12c1_18,6600000,60000,180000,20000,k1_18,
k10_1_18); run;
%range(k11_2_18,k12a2_18,k12b2_18,k12c2_18,600000,60000,180000,20000,k10_2_1
8);run;
%range(k13_1_18,k14a1_18,k14b1_18,k14c1_18,5300000,60000,180000,20000,k1_18,
k14a1_18); run; ****k14a1,k14a2 missing, then range 0-max;
%range(k13_2_18,k14a2_18,k14b2_18,k14c2_18,540000,60000,180000,20000,k14a2_1
8);run;
%range(k15_1_18,k16a1_18,k16b1_18,k16c1_18,5000000,20000,60000,7500,k1_18,k1
6a1_18);run; ****k16a1,k16a2 missing, then rang 0-max;
%range(k15_2_18,k16a2_18,k16b2_18,k16c2_18,60000,20000,60000,7500,k16a2_18);
run;



data output.group1_proxy_pension1;
merge datak11_1_18(drop=k1_18 k10_1_18)
datak11_2_18(drop=k10_2_18)
datak13_1_18(drop=k1_18 k14a1_18)
datak13_2_18(drop=k14a2_18)
datak15_1_18(drop=k1_18 k16a1_18)
datak15_2_18(drop=k16a2_18) ;
run;

**** dd_1;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk11_1_18
k11_1_imp_18
lowk11_1_18 upk11_1_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk11_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk11_1_18 upk11_1_18
k11_1_imp_18
;
bounds
imamk11_1_18 (>=lowk11_1_18 ,<=upk11_1_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;


**** dd_2;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk11_2_18
k11_2_imp_18
lowk11_2_18 upk11_2_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk11_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk11_2_18 upk11_2_18
k11_2_imp_18
;
bounds
imamk11_2_18 (>=lowk11_2_18 ,<=upk11_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;


*** dd_3;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk13_1_18
k13_1_imp_18
lowk13_1_18 upk13_1_18
;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk13_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk13_1_18 upk13_1_18
k13_1_imp_18
;
bounds
imamk13_1_18 (>=lowk13_1_18 ,<=upk13_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

*** dd_4;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk13_2_18
k13_2_imp_18
lowk13_2_18 upk13_2_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_4;
categorical sex_18 ;
count age_18;
mixed imamk13_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk13_2_18 upk13_2_18
k13_2_imp_18
;
bounds
```

```
imamk13_2_18 (>=lowk13_2_18 ,<=upk13_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

*** dd_5;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk15_1_18
k15_1_imp_18
lowk15_1_18 upk15_1_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_5;
categorical sex_18 ;
count age_18;
mixed imamk15_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk15_1_18 upk15_1_18
k15_1_imp_18
;
bounds
imamk15_1_18 (>=lowk15_1_18 ,<=upk15_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

*** dd_6;
data dd1; set output.group1_proxy_pension1;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk15_2_18
k15_2_imp_18
lowk15_2_18 upk15_2_18
;
```

```
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_6;
categorical sex_18 ;
count age_18;
mixed imamk15_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk15_2_18 upk15_2_18
k15_2_imp_18
;
bounds
imamk15_2_18 (>=lowk15_2_18 ,<=upk15_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_proxy_pension1_imputed;
merge dd_1 dd_2 dd_3 dd_4 dd_5 dd_6; by cunicah subhog_18;
drop lowk11_1_18 upk11_1_18
lowk11_2_18 upk11_2_18
lowk13_1_18 upk13_1_18
lowk13_2_18 upk13_2_18
lowk15_1_18 upk15_1_18
lowk15_2_18 upk15_2_18;
run;

/* data temp; set imp.group1_proxy_pension1_imputed; run;
proc freq ; table imamk11_1_18 ; where k11_1_imp_18=1; run;
proc freq; table imamk11_2_18; where k11_2_imp_18=1; run;
proc freq; table imamk13_1_18; where k13_1_imp_18 =1; run;
proc freq; table imamk13_2_18; where k13_2_imp_18 =1; run;
proc freq; table imamk15_1_18; where k15_1_imp_18 =1; run;
proc freq; table imamk15_2_18; where k15_2_imp_18 =1; run;
proc means; var imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18
imamk15_1_18
imamk15_2_18; run; */

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk27_1_18=k27_1_18; **** Imputation N=4;
```

```
if k17_18=2 and missing(k27_1_18) then imamk27_1_18=0;
if k17_18=1 and k26_1_18=2 and missing(k27_1_18) then imamk27_1_18=0;
if k17_18=1 and k26_1_18=1 and k27_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk27_1_18=.;
if missing(imamk27_1_18) and missing(k28a1_18) then k28a1_18=9;
imamk29_1_18=k29_1_18; **** Imputation N=6;
if k17_18=2 and missing(k29_1_18) then imamk29_1_18=0;
if k17_18=1 and k29_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk29_1_18=.;
if missing(imamk29_1_18) and missing(k30a1_18) then k30a1_18=9;
k27_1_imp_18=1*(missing(imamk27_1_18));
k29_1_imp_18=1*(missing(imamk29_1_18));
run;
/*
proc means data=bb2;
var imamk27_1_18 imamk29_1_18;
run;
proc freq data=bb2;
tables k27_1_imp_18 k29_1_imp_18;
run;
*/
%range(k27_1_18,k28a1_18,k28b1_18,k28c1_18,125000,6000,18000,2000,k17_18,k26
_1_18);run;
%range(k29_1_18,k30a1_18,k30b1_18,k30c1_18,400000,800,2500,200,k17_18,k30a1_
18);run;

data output.group1_proxy_pension2;
merge
datak27_1_18(drop=k17_18 k26_1_18)
datak29_1_18(drop=k17_18 k30a1_18);
run;

data dd1; set output.group1_proxy_pension2; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk27_1_18 imamk29_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk27_1_18 upk27_1_18
lowk29_1_18 upk29_1_18
k27_1_imp_18
k29_1_imp_18
```

```
;
bounds
imamk27_1_18 (>=lowk27_1_18 ,<=upk27_1_18)
imamk29_1_18 (>=lowk29_1_18 ,<=upk29_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_proxy_pension2_imputed;
set dd_1;
drop lowk27_1_18 upk27_1_18
lowk29_1_18 upk29_1_18;
run;
/*
proc freq; table imamk27_1_18; where k27_1_imp_18 =1; run; **** imputed;
proc freq; table imamk29_1_18; where k29_1_imp_18 =1; run; **** imputed; */

**************** 3 ***********;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk36_1_18=k36_1_18; **** Imputation N=10;
if k31a_18=2 and missing(k36_1_18) then imamk36_1_18=0;
if k31a_18=1 and k35_1_18=2 and missing(k36_1_18) then imamk36_1_18=0;
if k31a_18=1 and k35_1_18=1 and k36_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_1_18=.;
if missing(imamk36_1_18) and missing(k37a1_18) then k37a1_18=9;
imamk36_2_18=k36_2_18; **** Imputation N=2;
if k31b_18=2 and missing(k36_2_18) then imamk36_2_18=0;
if k31b_18=1 and k35_2_18=2 and missing(k36_2_18) then imamk36_2_18=0;
if k31b_18=1 and k35_2_18=1 and k36_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_2_18=.;
if missing(imamk36_2_18) and missing(k37a2_18) then k37a2_18=9;
imamk36_3_18=k36_3_18; **** Imputation N=3;
if k31c_18=2 and missing(k36_3_18) then imamk36_3_18=0;
if k31c_18=1 and k35_3_18=2 and missing(k36_3_18) then imamk36_3_18=0;
if k31c_18=1 and k35_3_18=1 and k36_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk36_3_18=.;
if missing(imamk36_3_18) and missing(k37a3_18) then k37a3_18=9;
k36_1_imp_18=1*(missing(imamk36_1_18));
k36_2_imp_18=1*(missing(imamk36_2_18));
k36_3_imp_18=1*(missing(imamk36_3_18));
run;
/*
```

```
proc freq data=bb2;
tables k36_1_imp_18 k36_2_imp_18 k36_3_imp_18;
run;
proc means data=bb2;
var imamk36_1_18 imamk36_2_18 imamk36_3_18;
run;
*/

%range(k36_1_18,k37a1_18,k37b1_18,k37c1_18,600000,400,2000,200,k31a_18,k35_1
_18);run;
%range(k36_2_18,k37a2_18,k37b2_18,k37c2_18,89893,400,2000,200,k31b_18,k35_2_
18);run;
%range(k36_3_18,k37a3_18,k37b3_18,k37c3_18,750000,400,2000,200,k31c_18,k35_3
_18);run;

data output.group1_proxy_pension3;
merge datak36_1_18 datak36_2_18 datak36_3_18 ;
run;

data dd1;
set output.group1_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_1_18 upk36_1_18
k36_1_imp_18
imamk36_1_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk36_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_1_18 upk36_1_18
k36_1_imp_18
;
bounds
imamk36_1_18 (>=lowk36_1_18 ,<=upk36_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
```

```
run;

data dd1;
set output.group1_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_2_18 upk36_2_18
k36_2_imp_18
imamk36_2_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk36_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_2_18 upk36_2_18
k36_2_imp_18
;
bounds
imamk36_2_18 (>=lowk36_2_18 ,<=upk36_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1;
set output.group1_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18
lowk36_3_18 upk36_3_18
k36_3_imp_18
imamk36_3_18
yrschool sex_18 age_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
```

```
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk36_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk36_3_18 upk36_3_18
k36_3_imp_18
;
bounds
imamk36_3_18 (>=lowk36_3_18 ,<=upk36_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_proxy_pension3_imputed;
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop lowk36_1_18 upk36_1_18
lowk36_2_18 upk36_2_18
lowk36_3_18 upk36_3_18;
run;


***************** 4 ******************;
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk47_18=k47a1_18; **** Imputation N=9;
if k47_18 = 2 and missing(k47a1_18) then imamk47_18=0;
if missing(k47_18) and missing(k47a1_18) then imamk47_18=0;
if k47_18 = 1 and k47a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk47_18=.;
if missing(imamk47_18) and missing(k47b1_18) then k47b1_18=9;
imamk48_18=k48a_monthly_18; **** Imputation N=8;
if k48_18 = 2 and missing(k48a_monthly_18) then imamk48_18=0;
if missing(k48_18) and missing(k48a_monthly_18) then imamk48_18=0;
*if k48_18 = 1 and k48a_monthly_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk48_18=.;
if k48_18 = 1 and k48a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk48_18=.;
if missing(imamk48_18) and missing(k48b1_18) then k48b1_18=9;
imamk50_18=k50a1_18; **** Imputation N=1;
if k50_18 = 2 and missing(k50a1_18) then imamk50_18=0;
if missing(k50_18) and missing(k50a1_18) then imamk50_18=0;
```

```
if k50_18 = 1 and k50a1_18
in(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999
999) then imamk50_18=.;
if missing(imamk50_18) and missing(k50b1_18) then k50b1_18=9;
imamk51_18=k51a_monthly_18; **** Imputation N=1;
if k51_18 =2 and missing(k51a_monthly_18) then imamk51_18=0;
if missing(k51_18) and missing(k51a_monthly_18) then imamk51_18=0;
if k51_18 =1 and k51a1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk51_18=.;
if missing(imamk51_18) and missing(k51b1_18) then k51b1_18=9;
dumk47_18=1*(missing(imamk47_18));
dumk48_18=1*(missing(imamk48_18));
dumk50_18=1*(missing(imamk50_18));
dumk51_18=1*(missing(imamk51_18));
run;


/*
proc freq data=bb2;
tables dumk47_18 dumk48_18 dumk50_18 dumk51_18;
run;
proc means data=bb2;
var imamk47_18 imamk48_18 imamk50_18 imamk51_18;
run;
*/
%range(k47_18,k47b1_18,k47b2_18,k47b3_18, 800000,7500,15000,2000,k47_18);
run;
%range(k48_18,k48b1_18,k48b2_18,k48b3_18, 100000,7500,15000,2000,k48_18);
run;
%range(k50_18,k50b1_18,k50b2_18,k50b3_18, 140000,7500,15000,2000,k50_18);
run;
%range(k51_18,k51b1_18,k51b2_18,k51b3_18, 100000,7500,15000,2000,k51_18);
run; *max=3333.33 < upper range of the bracket(15000), and max of k57(2nd
job bonus from spouse) is also <15000, so use bonus from primary job as
refernce;


/*
proc print data=Datak51_18; var cunicah lowk51_18 upk51_18; where
dumk51_18=1;
run;
*/

data output.group1_proxy_pension4;
merge
datak47_18(drop=k47_18)
datak48_18(drop=k48_18)
datak50_18(drop=k50_18)
datak51_18(drop=k51_18);
by cunicah subhog_18;
run;
```

```
data dd1; set output.group1_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
imamk47_18 imamk51_18
lowk47_18 upk47_18
lowk51_18 upk51_18
dumk47_18
dumk51_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk47_18 imamk51_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk47_18 upk47_18
lowk51_18 upk51_18
dumk47_18
dumk51_18
;
bounds
imamk47_18 (>=lowk47_18 ,<=upk47_18)
imamk51_18 (>=lowk51_18 ,<=upk51_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group1_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
imamk48_18 lowk48_18 upk48_18 dumk48_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
```

```
count age_18;
mixed imamk48_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk48_18 upk48_18
dumk48_18
;
bounds
imamk48_18 (>=lowk48_18 ,<=upk48_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group1_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
imamk50_18 lowk50_18 upk50_18 dumk50_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk50_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk50_18 upk50_18
dumk50_18
;
bounds
imamk50_18 (>=lowk50_18 ,<=upk50_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data data imp.group1_proxy_pension4_imputed;
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop lowk47_18 upk47_18
```

```
lowk48_18 upk48_18
lowk50_18 upk50_18
lowk51_18 upk51_18 ; run;

data data imp.group1_core_pension4_imputed;
set dd_1;
drop lowk47_18 upk47_18
lowk48_18 upk48_18
lowk50_18 upk50_18
lowk51_18 upk51_18;
run;

/* data temp; set imp.group1_proxy_pension4_imputed; run;
proc freq; table imamk47_18; where dumk47_18 =1 ; run; *** imputed;
proc freq; table imamk48_18; where dumk48_18 =1; run; *** imputed;
proc freq; table imamk50_18; where dumk50_18 =1; run; *** imputed;
proc freq; table imamk51_18; where dumk51_18 =1; run; *** imputed; */

********* 5 *********;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk61_1_1_18=k61_1_1_18;**** Imputation N=17;
if k58a_18 =2 and missing(k61_1_1_18) then imamk61_1_1_18=0;
if missing(k58a_18) and missing(k61_1_1_18) then imamk61_1_1_18=0;
if k58a_18=1 and k61_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_1_1_18=.;
if missing(imamk61_1_1_18) and missing(k62a1_1_18) then k62a1_1_18=9;
imamk61_1_2_18=k61_1_2_18;**** Imputation N=1;
if k58a_18 in (2,8,9) and missing(k61_1_2_18) then imamk61_1_2_18=0;
if missing(k58a_18) and missing(k61_1_2_18) then imamk61_1_2_18=0;
if k58a_18 =1 and k61_1_2_18=. then imamk61_1_2_18=0;
if k58a_18=1 and k61_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_1_2_18=.;
if missing(imamk61_1_2_18) and missing(k62a1_2_18) then k62a1_2_18=9;
imamk61_2_1_18=k61_2_1_18;**** Imputation N=23;
if k58b_18 =2 and missing(k61_2_1_18) then imamk61_2_1_18=0;
if missing(k58b_18) and missing(k61_2_1_18) then imamk61_2_1_18=0;
if k58b_18=1 and k61_2_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_2_1_18=.;
if missing(imamk61_2_1_18) and missing(k62a2_1_18) then k62a2_1_18=9;
imamk61_2_2_18=k61_2_2_18;**** Imputation N=1;
if k58b_18 in (2,8,9) and missing(k61_2_2_18) then imamk61_2_2_18=0;
if missing(k58b_18) and missing(k61_2_2_18) then imamk61_2_2_18=0;
if k58b_18 =1 and k61_2_2_18=. then imamk61_2_2_18=0;
if k58b_18=1 and k61_2_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_2_2_18=.;
if missing(imamk61_2_2_18) and missing(k62a2_2_18) then k62a2_2_18=9;
```

```
imamk61_3_1_18=k61_3_1_18;**** Imputation N=2;
if k58c_18 =2 and missing(k61_3_1_18) then imamk61_3_1_18=0;
if missing(k58c_18) and missing(k61_3_1_18) then imamk61_3_1_18=0;
if k58c_18=1 and k61_3_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_3_1_18=.;
if missing(imamk61_3_1_18) and missing(k62a3_1_18) then k62a3_1_18=9;
imamk61_3_2_18=k61_3_2_18;**** Imputation N=0;
if k58c_18 in (2,8,9) and missing(k61_3_2_18) then imamk61_3_2_18=0;
if missing(k58c_18) and missing(k61_3_2_18) then imamk61_3_2_18=0;
if k58c_18 =1 and k61_3_2_18=. then imamk61_3_2_18=0;
if k58c_18=1 and k61_3_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_3_2_18=.;
if missing(imamk61_3_2_18) and missing(k62a3_2_18) then k62a3_2_18=9;
imamk61_4_1_18=k61_4_1_18;**** Imputation N=2;
if k58d_18 =2 and missing(k61_4_1_18) then imamk61_4_1_18=0;
if missing(k58d_18) and missing(k61_4_1_18) then imamk61_4_1_18=0;
if k58d_18=1 and k61_4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_4_1_18=.;
if missing(imamk61_4_1_18) and missing(k62a4_1_18) then k62a4_1_18=9;
imamk61_4_2_18=k61_4_2_18;**** Imputation N=0;
if k58d_18 in (2,8,9) and missing(k61_4_2_18) then imamk61_4_2_18=0;
if missing(k58d_18) and missing(k61_4_2_18) then imamk61_4_2_18=0;
if k58d_18 =1 and k61_4_2_18=. then imamk61_4_2_18=0;
if k58d_18=1 and k61_4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk61_4_2_18=.;
if missing(imamk61_4_2_18) and missing(k62a4_2_18) then k62a4_2_18=9;
k61_1_1_imp_18=1*(missing(imamk61_1_1_18));
k61_1_2_imp_18=1*(missing(imamk61_1_2_18));
k61_2_1_imp_18=1*(missing(imamk61_2_1_18));
k61_2_2_imp_18=1*(missing(imamk61_2_2_18));
k61_3_1_imp_18=1*(missing(imamk61_3_1_18));
k61_3_2_imp_18=1*(missing(imamk61_3_2_18));
k61_4_1_imp_18=1*(missing(imamk61_4_1_18));
k61_4_2_imp_18=1*(missing(imamk61_4_2_18));
run;

/*
proc freq data=bb2;
tables k61_1_1_imp_18 k61_1_2_imp_18 k61_2_1_imp_18 k61_2_2_imp_18
k61_3_1_imp_18 k61_3_2_imp_18 k61_4_1_imp_18 k61_4_2_imp_18;
run;
proc means data=bb2 max;
var imamk61_1_1_18 imamk61_1_2_18 imamk61_2_1_18 imamk61_2_2_18
imamk61_3_1_18 imamk61_3_2_18 imamk61_4_1_18 imamk61_4_2_18;
run;
*/
```

```
%range(k61_1_1_18,k62a1_1_18,k62b1_1_18,k62c1_1_18,
300000,2000,7500,950,k58a_18);run;
%range(k61_1_2_18,k62a1_2_18,k62b1_2_18,k62c1_2_18, 50000,2000,7500,950);
run;
%range(k61_2_1_18,k62a2_1_18,k62b2_1_18,k62c2_1_18,
88000,2000,7500,950,k58b_18);run;
%range(k61_2_2_18,k62a2_2_18,k62b2_2_18,k62c2_2_18, 8500,2000,7500,950);
run;
%range(k61_3_1_18,k62a3_1_18,k62b3_1_18,k62c3_1_18,
28000,2000,7500,950,k58c_18);run;
%range(k61_3_2_18,k62a3_2_18,k62b3_2_18,k62c3_2_18, 0,2000,7500,950); run;/*
no observation ; */
%range(k61_4_1_18,k62a4_1_18,k62b4_1_18,k62c4_1_18,
45000,2000,7500,950,k58d_18);run;
%range(k61_4_2_18,k62a4_2_18,k62b4_2_18,k62c4_2_18, 2500,2000,7500,950);
run;/* no observation ; */


data output.group1_proxy_pension5;
merge
datak61_1_1_18(drop=k58a_18) datak61_1_2_18
datak61_2_1_18(drop=k58b_18) datak61_2_2_18
datak61_3_1_18(drop=k58c_18) datak61_3_2_18
datak61_4_1_18(drop=k58d_18) datak61_4_2_18;
by cunicah subhog_18;
run;


****** run P5 section 1 - output dd_1;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_1_1_18 yrschool
lowk61_1_1_18 upk61_1_1_18
k61_1_1_imp_18 ;
run;


options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_1_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_1_1_18
upk61_1_1_18
k61_1_1_imp_18
;
bounds
imamk61_1_1_18 (>=lowk61_1_1_18 ,<=upk61_1_1_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 1 - output dd_2;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_1_2_18 yrschool
lowk61_1_2_18 upk61_1_2_18
k61_1_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk61_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_1_2_18
upk61_1_2_18
k61_1_2_imp_18
;
bounds
imamk61_1_2_18 (>=lowk61_1_2_18 ,<=upk61_1_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_proxy_pension5_imputed1; merge dd_1 dd_2; by cunicah
subhog_18;
drop lowk61_1_1_18 upk61_1_1_18
lowk61_1_2_18 upk61_1_2_18 ;
run;
proc freq; table imamk61_1_1_18; where k61_1_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_1_2_18; where k61_1_2_imp_18 =1; run; *** imputed;
```

```
****** run P5 section 2 - output dd_1;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_2_1_18 yrschool
lowk61_2_1_18 upk61_2_1_18
k61_2_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_2_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_2_1_18
upk61_2_1_18
k61_2_1_imp_18
;
bounds
imamk61_2_1_18 (>=lowk61_2_1_18 ,<=upk61_2_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 2 - output dd_2;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_2_2_18 yrschool
lowk61_2_2_18 upk61_2_2_18
k61_2_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
```

```
count age_18;
mixed imamk61_2_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_2_2_18
upk61_2_2_18
k61_2_2_imp_18
;
bounds
imamk61_2_2_18 (>=lowk61_2_2_18 ,<=upk61_2_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_proxy_pension5_imputed2;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_2_1_18 upk61_2_1_18
lowk61_2_2_18 upk61_2_2_18 ;
run;
proc freq; table imamk61_2_1_18; where k61_2_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_2_2_18; where k61_2_2_imp_18 =1; run; *** imputed;

****** run P5 section 3 - output dd_1;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_3_1_18 yrschool
lowk61_3_1_18 upk61_3_1_18
k61_3_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_3_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_3_1_18
upk61_3_1_18
k61_3_1_imp_18
;
bounds
```

```
imamk61_3_1_18 (>=lowk61_3_1_18 ,<=upk61_3_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 3 - output dd_2;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_3_2_18 yrschool
lowk61_3_2_18 upk61_3_2_18
k61_3_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk61_3_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_3_2_18
upk61_3_2_18
k61_3_2_imp_18
;
bounds
imamk61_3_2_18 (>=lowk61_3_2_18 ,<=upk61_3_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_proxy_pension5_imputed3;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_3_1_18 upk61_3_1_18
lowk61_3_2_18 upk61_3_2_18 ;
run;
proc freq; table imamk61_3_1_18; where k61_3_1_imp_18 =1; run; *** imputed;
```

```
proc freq; table imamk61_3_2_18; where k61_3_2_imp_18 =1; run; *** imputed;

****** run P5 section 4 - output dd_1;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_4_1_18 yrschool
lowk61_4_1_18 upk61_4_1_18
k61_4_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk61_4_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_4_1_18
upk61_4_1_18
k61_4_1_imp_18
;
bounds
imamk61_4_1_18 (>=lowk61_4_1_18 ,<=upk61_4_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

****** run P5 section 4 - output dd_2;
data dd1;
set output.group1_proxy_pension5;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 imamk61_4_2_18 yrschool
lowk61_4_2_18 upk61_4_2_18
k61_4_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
```

```
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk61_4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk61_4_2_18
upk61_4_2_18
k61_4_2_imp_18
;
bounds
imamk61_4_2_18 (>=lowk61_4_2_18 ,<=upk61_4_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group1_proxy_pension5_imputed4;
merge dd_1 dd_2;
by cunicah subhog_18;
drop lowk61_4_1_18 upk61_4_1_18
lowk61_4_2_18 upk61_4_2_18 ;
run;
proc freq; table imamk61_4_1_18; where k61_4_1_imp_18 =1; run; *** imputed;
proc freq; table imamk61_4_2_18; where k61_4_2_imp_18 =1; run; *** imputed;


********** 6 ******************;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk80_1_1_18=k80_1_1_18; **** Imputation N=9;
if k79a_18 =2 and missing(k80_1_1_18) then imamk80_1_1_18=0; *N=8099;
if missing(k79a_18) and missing(k80_1_1_18) then imamk80_1_1_18=0; *N=0;
if k79a_18=1 and k80_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk80_1_1_18=.; *N=63;
imamk80_3_18=k80_3_18; **** Imputation N=1;
if k79c_18 =2 and missing(k80_3_18) then imamk80_3_18=0;*N=10600;
if missing(k79c_18) and missing(k80_3_18) then imamk80_3_18=0; *N=0;
if k79c_18=1 and k80_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9,9999998) then imamk80_3_18=.; *N=11;
imamk80_1_2_18=k80_1_2_18; **** Imputation N=6;
if k79a_18 in (2, 8, 9) and missing(k80_1_2_18) then imamk80_1_2_18=0;
*N=8117;
if missing(k79a_18) and missing(k80_1_2_18) then imamk80_1_2_18=0; *N=0;
if k79a_18=1 and k80_1_2_18=. then imamk80_1_2_18=0; *N=2377;
```

```
if k79a_18=1 and k80_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk80_1_2_18=.; *N=21;
k80_1_1_imp_18=missing(imamk80_1_1_18);
k80_1_2_imp_18=missing(imamk80_1_2_18);
k80_3_imp_18=missing(imamk80_3_18);
run;
/*
proc freq data=bb2;
tables k80_1_1_imp_18 k80_1_2_imp_18 k80_3_imp_18;
run;
proc means data=bb2;
var imamk80_1_1_18 imamk80_1_2_18 imamk80_3_18;
run;
*/

data datak80; set bb2
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imamk80_1_1_18
imamk80_1_2_18 imamk80_3_18 k79a_18 k79c_18 k80_1_1_imp_18 k80_1_2_imp_18
k80_3_imp_18);
lowk80_1_1_18=1; upk80_1_1_18=20000;
if k79a_18 in (8,9) then lowk80_1_1_18=0;
lowk80_1_2_18=1; upk80_1_2_18=20000;
lowk80_3_18=1; upk80_3_18=4000000;
if k79c_18 in (8,9) then lowk80_3_18=0;
if imamk80_1_1_18 >=0 then do;
lowk80_1_1_18=imamk80_1_1_18;upk80_1_1_18=imamk80_1_1_18; end;
if imamk80_1_2_18 >=0 then do; lowk80_1_2_18=imamk80_1_2_18;
upk80_1_2_18=imamk80_1_2_18; end;
if imamk80_3_18 >=0 then do; lowk80_3_18=imamk80_3_18;
upk80_3_18=imamk80_3_18; end;
run;

data output.group1_proxy_pension6;
set datak80(drop=k79a_18 k79c_18);
run;

data dd1; set output.group1_proxy_pension6; **** Core nonproxy N=683 var=14;
keep cunicah subhog_18 tipent_hh_18
sex_18 age_18 yrschool
imamk80_1_1_18 lowk80_1_1_18 upk80_1_1_18 k80_1_1_imp_18
imamk80_1_2_18 lowk80_1_2_18 upk80_1_2_18 k80_1_2_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
```

```
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk80_1_1_18 imamk80_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk80_1_1_18 upk80_1_1_18
lowk80_1_2_18 upk80_1_2_18
k80_1_1_imp_18
k80_1_2_imp_18
;
bounds
imamk80_1_1_18 (>=lowk80_1_1_18 ,<=upk80_1_1_18)
imamk80_1_2_18 (>=lowk80_1_2_18 ,<=upk80_1_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group1_proxy_pension6;
keep cunicah subhog_18 tipent_hh_18
sex_18 age_18 yrschool
imamk80_3_18 lowk80_3_18 upk80_3_18 k80_3_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk80_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk80_3_18 upk80_3_18
k80_3_imp_18
;
bounds
imamk80_3_18 (>=lowk80_3_18 ,<=upk80_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
```

```
run;

data data imp.group1_proxy_pension6_imputed; merge dd_1 dd_2; by cunicah
subhog_18;
drop lowk80_1_1_18 upk80_1_1_18
lowk80_1_2_18 upk80_1_2_18
lowk80_3_18 upk80_3_18 ;
run;

proc freq; table imamk80_1_1_18; where k80_1_1_imp_18 =1; run;
proc freq; table imamk80_1_2_18; where k80_1_2_imp_18 =1; run;
proc freq; table imamk80_3_18; where k80_3_imp_18 =1;run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group1_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 3/2/2021 */
/*
*/
/*******************************************************/


Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

******************** core/help ***********************;
*** print output: prior imputation/ with zero;
Title "Group1 core help - before imputation (mean with zero)";
proc means data=output.group1_core_help n nmiss mean std min max ;
variable imamg18_18;
run;


*** print output: prior imputation/ without zero;
data group1; set output.group1_core_help;
if imamg18_18=0 then imamg18_18=.;
run;
Title "Group1 core help - before imputation (mean without zero)";
proc means data=group1 n nmiss mean std min max  ;
variable imamg18_18; run;


*** print output-imputed: mean with zero;
Title "Group1 core help - imputed (mean with zero)";
proc means n nmiss mean std min max data=imp.group1_core_help_imputed;
var imamg18_18;
run;


*** print output-imputed: mean without zero;
data group2; set imp.group1_core_help_imputed;
if imamg18_18=0 then imamg18_18=.;
run;
Title "Group1 core help - imputed (mean without zero)";
proc means data=group2 n mean std min max ;
var imamg18_18;
run;


******************** core/j36b ***********************;
*** print putput: prior imputation;
Title "Group 1 core J36b - before imputation (mean with zero)";
proc means data=output.Group1_core_J36b n nmiss mean std min max;
variable imamj36b_18 ; run;
Title "Group 1 core J36b - before imputation (mean without zero)";
data group1; set output.Group1_core_J36b;
if imamj36b_18 =0 then imamj36b_18 =.;
run;
proc means data=group1 n mean std min max ;
```

```
var imamj36b_18 ; run;

*** print putput: mean with zero;
Title "Group 1 core J36b - imputed (mean with zero)";
proc means n nmiss mean std min max data=imp.Group1_core_J36b_imputed;
var imamj36b_18 ;
run;
*** print output: mean without zero;
data group2; set imp.Group1_core_J36b_imputed;
if imamj36b_18 =0 then imamj36b_18 =.;
run;
Title "Group 1 core J36b - imputed (mean without zero)";
proc means data=group2 n mean std min max ;
var imamj36b_18 ; run;

************* proxy/j36b ***********************;
data out1;
set output.Group1_proxy_J36b;
by cunicah subhog_18;
rename imamj36b_18=amj36b_18;run;
data imp1;
set imp.Group1_proxy_j36b_imputed;
by cunicah subhog_18; run;

data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group1 proxy J36b - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amj36b_18 imamj36b_18 ; run;

Title "Group1 proxy J36b - mean without zero";
data out_imp2; set out_imp1;
if imamj36b_18 =0 then imamj36b_18 =.;
if amj36b_18 =0 then amj36b_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amj36b_18 imamj36b_18 ;
run;




************* core/pension ***********************;
data out1;
merge output.group1_core_pension1 output.group1_core_pension2
output.group1_core_pension3 output.group1_core_pension4
output.group1_core_pension5 output.group1_core_pension6 ;
by cunicah subhog_18;
```

```
rename imamk11_1_18=amk11_1_18 imamk11_2_18=amk11_2_18
imamk13_1_18=amk13_1_18 imamk13_2_18=amk13_2_18 imamk15_1_18=amk15_1_18
imamk15_2_18=amk15_2_18
imamk27_1_18=amk27_1_18 imamk29_1_18=amk29_1_18
imamk36_1_18=amk36_1_18 imamk36_2_18=amk36_2_18 imamk36_3_18=amk36_3_18
imamk47_18=amk47_18 imamk48_18=amk48_18 imamk50_18=amk50_18
imamk51_18=amk51_18
imamk61_1_1_18=amk61_1_1_18 imamk61_1_2_18=amk61_1_2_18
imamk61_2_1_18=amk61_2_1_18 imamk61_2_2_18=amk61_2_2_18
imamk61_3_1_18=amk61_3_1_18 imamk61_3_2_18=amk61_3_2_18
imamk61_4_1_18=amk61_4_1_18 imamk61_4_2_18=amk61_4_2_18
imamk80_1_1_18=amk80_1_1_18 imamk80_1_2_18=amk80_1_2_18
imamk80_3_18=amk80_3_18;run;
data imp1;
merge imp.group1_core_pension1_imputed imp.group1_core_pension2_imputed
imp.group1_core_pension3_imputed imp.group1_core_pension4_imputed
imp.group1_core_pension5_imputed1 imp.group1_core_pension5_imputed2
imp.group1_core_pension5_imputed3
imp.group1_core_pension5_imputed4 imp.group1_core_pension6_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;


*** print putput;
Title "Group1 core pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk11_1_18 imamk11_1_18 amk11_2_18 imamk11_2_18 amk13_1_18
imamk13_1_18 amk13_2_18 imamk13_2_18 amk15_1_18 imamk15_1_18 amk15_2_18
imamk15_2_18
amk27_1_18 imamk27_1_18 amk29_1_18 imamk29_1_18
amk36_1_18 imamk36_1_18 amk36_2_18 imamk36_2_18 amk36_3_18 imamk36_3_18
amk47_18 imamk47_18 amk48_18 imamk48_18 amk50_18 imamk50_18 amk51_18
imamk51_18
amk61_1_1_18 imamk61_1_1_18 amk61_1_2_18 imamk61_1_2_18
amk61_2_1_18 imamk61_2_1_18 amk61_2_2_18 imamk61_2_2_18
amk61_3_1_18 imamk61_3_1_18 amk61_3_2_18 imamk61_3_2_18
amk61_4_1_18 imamk61_4_1_18 amk61_4_2_18 imamk61_4_2_18
amk80_1_1_18 imamk80_1_1_18 amk80_1_2_18 imamk80_1_2_18 amk80_3_18
imamk80_3_18; run;

Title "Group1 core pension - mean without zero";
data out_imp2; set out_imp1;
if imamk11_1_18 =0 then imamk11_1_18 =.;
if imamk11_2_18 =0 then imamk11_2_18 =.;
if imamk13_1_18 =0 then imamk13_1_18 =.;
if imamk13_2_18 =0 then imamk13_2_18 =.;
if imamk15_1_18 =0 then imamk15_1_18 =.;
if imamk15_2_18 =0 then imamk15_2_18 =.;
if imamk27_1_18 =0 then imamk27_1_18 =.;
if imamk29_1_18 =0 then imamk29_1_18 =.;
if imamk36_1_18 =0 then imamk36_1_18 =.;
```

```
if imamk36_2_18 =0 then imamk36_2_18 =.;
if imamk36_3_18 =0 then imamk36_3_18 =.;
if imamk47_18 =0 then imamk47_18 =.;
if imamk48_18 =0 then imamk48_18 =.;
if imamk50_18 =0 then imamk50_18 =.;
if imamk51_18 =0 then imamk51_18 =.;
if imamk61_1_1_18 =0 then imamk61_1_1_18 =.;
if imamk61_1_2_18 =0 then imamk61_1_2_18 =.;
if imamk61_2_1_18 =0 then imamk61_2_1_18 =.;
if imamk61_2_2_18 =0 then imamk61_2_2_18 =.;
if imamk61_3_1_18 =0 then imamk61_3_1_18 =.;
if imamk61_3_2_18 =0 then imamk61_3_2_18 =.;
if imamk61_4_1_18 =0 then imamk61_4_1_18 =.;
if imamk61_4_2_18 =0 then imamk61_4_2_18 =.;
if imamk80_1_1_18 =0 then imamk80_1_1_18=.;
if imamk80_1_2_18 =0 then imamk80_1_2_18=.;
if imamk80_3_18 =0 then imamk80_3_18=.;

if amk11_1_18 =0 then amk11_1_18 =.;
if amk11_2_18 =0 then amk11_2_18 =.;
if amk13_1_18 =0 then amk13_1_18 =.;
if amk13_2_18 =0 then amk13_2_18 =.;
if amk15_1_18 =0 then amk15_1_18 =.;
if amk15_2_18 =0 then amk15_2_18 =.;
if amk27_1_18 =0 then amk27_1_18 =.;
if amk29_1_18 =0 then amk29_1_18 =.;
if amk36_1_18 =0 then amk36_1_18 =.;
if amk36_2_18 =0 then amk36_2_18 =.;
if amk36_3_18 =0 then amk36_3_18 =.;
if amk47_18 =0 then amk47_18 =.;
if amk48_18 =0 then amk48_18 =.;
if amk50_18 =0 then amk50_18 =.;
if amk51_18 =0 then amk51_18 =.;
if amk61_1_1_18 =0 then amk61_1_1_18 =.;
if amk61_1_2_18 =0 then amk61_1_2_18 =.;
if amk61_2_1_18 =0 then amk61_2_1_18 =.;
if amk61_2_2_18 =0 then amk61_2_2_18 =.;
if amk61_3_1_18 =0 then amk61_3_1_18 =.;
if amk61_3_2_18 =0 then amk61_3_2_18 =.;
if amk61_4_1_18 =0 then amk61_4_1_18 =.;
if amk61_4_2_18 =0 then amk61_4_2_18 =.;
if amk80_1_1_18 =0 then amk80_1_1_18=.;
if amk80_1_2_18 =0 then amk80_1_2_18=.;
if amk80_3_18 =0 then amk80_3_18=.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk11_1_18 imamk11_1_18 amk11_2_18 imamk11_2_18 amk13_1_18
imamk13_1_18 amk13_2_18 imamk13_2_18 amk15_1_18 imamk15_1_18 amk15_2_18
imamk15_2_18
amk27_1_18 imamk27_1_18 amk29_1_18 imamk29_1_18
amk36_1_18 imamk36_1_18 amk36_2_18 imamk36_2_18 amk36_3_18 imamk36_3_18
```

```
amk47_18 imamk47_18 amk48_18 imamk48_18 amk50_18 imamk50_18 amk51_18
imamk51_18
amk61_1_1_18 imamk61_1_1_18 amk61_1_2_18 imamk61_1_2_18
amk61_2_1_18 imamk61_2_1_18 amk61_2_2_18 imamk61_2_2_18
amk61_3_1_18 imamk61_3_1_18 amk61_3_2_18 imamk61_3_2_18
amk61_4_1_18 imamk61_4_1_18 amk61_4_2_18 imamk61_4_2_18
amk80_1_1_18 imamk80_1_1_18 amk80_1_2_18 imamk80_1_2_18 amk80_3_18
imamk80_3_18;
run;


************* proxy/pension ************************;
data out1;
merge output.group1_proxy_pension1 output.group1_proxy_pension2
output.group1_proxy_pension3 output.group1_proxy_pension4
output.group1_proxy_pension5 output.group1_proxy_pension6 ;
by cunicah subhog_18;
rename imamk11_1_18=amk11_1_18 imamk11_2_18=amk11_2_18
imamk13_1_18=amk13_1_18 imamk13_2_18=amk13_2_18 imamk15_1_18=amk15_1_18
imamk15_2_18=amk15_2_18
imamk27_1_18=amk27_1_18 imamk29_1_18=amk29_1_18
imamk36_1_18=amk36_1_18 imamk36_2_18=amk36_2_18 imamk36_3_18=amk36_3_18
imamk47_18=amk47_18 imamk48_18=amk48_18 imamk50_18=amk50_18
imamk51_18=amk51_18
imamk61_1_1_18=amk61_1_1_18 imamk61_1_2_18=amk61_1_2_18
imamk61_2_1_18=amk61_2_1_18 imamk61_2_2_18=amk61_2_2_18
imamk61_3_1_18=amk61_3_1_18 imamk61_3_2_18=amk61_3_2_18
imamk61_4_1_18=amk61_4_1_18 imamk61_4_2_18=amk61_4_2_18
imamk80_1_1_18=amk80_1_1_18 imamk80_1_2_18=amk80_1_2_18
imamk80_3_18=amk80_3_18;run;
data imp1;
merge imp.group1_proxy_pension1_imputed imp.group1_proxy_pension2_imputed
imp.group1_proxy_pension3_imputed imp.group1_proxy_pension4_imputed
imp.group1_proxy_pension5_imputed1 imp.group1_proxy_pension5_imputed2
imp.group1_proxy_pension5_imputed3
imp.group1_proxy_pension5_imputed4 imp.group1_proxy_pension6_imputed;
by cunicah subhog_18; run;


data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;


*** print putput;
Title "Group1 proxy pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk11_1_18 imamk11_1_18 amk11_2_18 imamk11_2_18 amk13_1_18
imamk13_1_18 amk13_2_18 imamk13_2_18 amk15_1_18 imamk15_1_18 amk15_2_18
imamk15_2_18
amk27_1_18 imamk27_1_18 amk29_1_18 imamk29_1_18
amk36_1_18 imamk36_1_18 amk36_2_18 imamk36_2_18 amk36_3_18 imamk36_3_18
amk47_18 imamk47_18 amk48_18 imamk48_18 amk50_18 imamk50_18 amk51_18
imamk51_18
amk61_1_1_18 imamk61_1_1_18 amk61_1_2_18 imamk61_1_2_18
```

```
amk61_2_1_18 imamk61_2_1_18 amk61_2_2_18 imamk61_2_2_18
amk61_3_1_18 imamk61_3_1_18 amk61_3_2_18 imamk61_3_2_18
amk61_4_1_18 imamk61_4_1_18 amk61_4_2_18 imamk61_4_2_18
amk80_1_1_18 imamk80_1_1_18 amk80_1_2_18 imamk80_1_2_18 amk80_3_18
imamk80_3_18; run;

Title "Group1 proxy pension - mean without zero";
data out_imp2; set out_imp1;
if imamk11_1_18 =0 then imamk11_1_18 =.;
if imamk11_2_18 =0 then imamk11_2_18 =.;
if imamk13_1_18 =0 then imamk13_1_18 =.;
if imamk13_2_18 =0 then imamk13_2_18 =.;
if imamk15_1_18 =0 then imamk15_1_18 =.;
if imamk15_2_18 =0 then imamk15_2_18 =.;
if imamk27_1_18 =0 then imamk27_1_18 =.;
if imamk29_1_18 =0 then imamk29_1_18 =.;
if imamk36_1_18 =0 then imamk36_1_18 =.;
if imamk36_2_18 =0 then imamk36_2_18 =.;
if imamk36_3_18 =0 then imamk36_3_18 =.;
if imamk47_18 =0 then imamk47_18 =.;
if imamk48_18 =0 then imamk48_18 =.;
if imamk50_18 =0 then imamk50_18 =.;
if imamk51_18 =0 then imamk51_18 =.;
if imamk61_1_1_18 =0 then imamk61_1_1_18 =.;
if imamk61_1_2_18 =0 then imamk61_1_2_18 =.;
if imamk61_2_1_18 =0 then imamk61_2_1_18 =.;
if imamk61_2_2_18 =0 then imamk61_2_2_18 =.;
if imamk61_3_1_18 =0 then imamk61_3_1_18 =.;
if imamk61_3_2_18 =0 then imamk61_3_2_18 =.;
if imamk61_4_1_18 =0 then imamk61_4_1_18 =.;
if imamk61_4_2_18 =0 then imamk61_4_2_18 =.;
if imamk80_1_1_18 =0 then imamk80_1_1_18=.;
if imamk80_1_2_18 =0 then imamk80_1_2_18=.;
if imamk80_3_18 =0 then imamk80_3_18=.;

if amk11_1_18 =0 then amk11_1_18 =.;
if amk11_2_18 =0 then amk11_2_18 =.;
if amk13_1_18 =0 then amk13_1_18 =.;
if amk13_2_18 =0 then amk13_2_18 =.;
if amk15_1_18 =0 then amk15_1_18 =.;
if amk15_2_18 =0 then amk15_2_18 =.;
if amk27_1_18 =0 then amk27_1_18 =.;
if amk29_1_18 =0 then amk29_1_18 =.;
if amk36_1_18 =0 then amk36_1_18 =.;
if amk36_2_18 =0 then amk36_2_18 =.;
if amk36_3_18 =0 then amk36_3_18 =.;
if amk47_18 =0 then amk47_18 =.;
if amk48_18 =0 then amk48_18 =.;
if amk50_18 =0 then amk50_18 =.;
if amk51_18 =0 then amk51_18 =.;
if amk61_1_1_18 =0 then amk61_1_1_18 =.;
if amk61_1_2_18 =0 then amk61_1_2_18 =.;
```

```
if amk61_2_1_18 =0 then amk61_2_1_18 =.;
if amk61_2_2_18 =0 then amk61_2_2_18 =.;
if amk61_3_1_18 =0 then amk61_3_1_18 =.;
if amk61_3_2_18 =0 then amk61_3_2_18 =.;
if amk61_4_1_18 =0 then amk61_4_1_18 =.;
if amk61_4_2_18 =0 then amk61_4_2_18 =.;
if amk80_1_1_18 =0 then amk80_1_1_18=.;
if amk80_1_2_18 =0 then amk80_1_2_18=.;
if amk80_3_18 =0 then amk80_3_18=.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk11_1_18 imamk11_1_18 amk11_2_18 imamk11_2_18 amk13_1_18
imamk13_1_18 amk13_2_18 imamk13_2_18 amk15_1_18 imamk15_1_18 amk15_2_18
imamk15_2_18
amk27_1_18 imamk27_1_18 amk29_1_18 imamk29_1_18
amk36_1_18 imamk36_1_18 amk36_2_18 imamk36_2_18 amk36_3_18 imamk36_3_18
amk47_18 imamk47_18 amk48_18 imamk48_18 amk50_18 imamk50_18 amk51_18
imamk51_18
amk61_1_1_18 imamk61_1_1_18 amk61_1_2_18 imamk61_1_2_18
amk61_2_1_18 imamk61_2_1_18 amk61_2_2_18 imamk61_2_2_18
amk61_3_1_18 imamk61_3_1_18 amk61_3_2_18 imamk61_3_2_18
amk61_4_1_18 imamk61_4_1_18 amk61_4_2_18 imamk61_4_2_18
amk80_1_1_18 imamk80_1_1_18 amk80_1_2_18 imamk80_1_2_18 amk80_3_18
imamk80_3_18;
run;
/*
*** print putput: prior imputation;
Title "Group1 core pension - before imputation (mean with zero)";
proc means data=out1 n nmiss mean std min max ;
variable imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18 imamk15_1_18
imamk15_2_18
imamk27_1_18 imamk29_1_18
imamk36_1_18 imamk36_2_18 imamk36_3_18
imamk47_18 imamk48_18 imamk50_18 imamk51_18
imamk61_1_1_18 imamk61_1_2_18
imamk61_2_1_18 imamk61_2_2_18
imamk61_3_1_18 imamk61_3_2_18
imamk61_4_1_18 imamk61_4_2_18
imamk80_1_1_18 imamk80_1_2_18 imamk80_3_18; run;

Title "Group1 core pension - before imputation (mean without zero)";
data out2; set out1;
if imamk11_1_18 =0 then imamk11_1_18 =.;
if imamk11_2_18 =0 then imamk11_2_18 =.;
if imamk13_1_18 =0 then imamk13_1_18 =.;
if imamk13_2_18 =0 then imamk13_2_18 =.;
if imamk15_1_18 =0 then imamk15_1_18 =.;
if imamk15_2_18 =0 then imamk15_2_18 =.;
if imamk27_1_18 =0 then imamk27_1_18 =.;
if imamk29_1_18 =0 then imamk29_1_18 =.;
if imamk36_1_18 =0 then imamk36_1_18 =.;
if imamk36_2_18 =0 then imamk36_2_18 =.;
```

```
if imamk36_3_18 =0 then imamk36_3_18 =.;
if imamk47_18 =0 then imamk47_18 =.;
if imamk48_18 =0 then imamk48_18 =.;
if imamk50_18 =0 then imamk50_18 =.;
if imamk51_18 =0 then imamk51_18 =.;
if imamk61_1_1_18 =0 then imamk61_1_1_18 =.;
if imamk61_1_2_18 =0 then imamk61_1_2_18 =.;
if imamk61_2_1_18 =0 then imamk61_2_1_18 =.;
if imamk61_2_2_18 =0 then imamk61_2_2_18 =.;
if imamk61_3_1_18 =0 then imamk61_3_1_18 =.;
if imamk61_3_2_18 =0 then imamk61_3_2_18 =.;
if imamk61_4_1_18 =0 then imamk61_4_1_18 =.;
if imamk61_4_2_18 =0 then imamk61_4_2_18 =.;
if imamk80_1_1_18 =0 then imamk80_1_1_18=.;
if imamk80_1_2_18 =0 then imamk80_1_2_18=.;
if imamk80_3_18 =0 then imamk80_3_18=.; run;
proc means data=out2 n mean std min max ;
variable imamk11_1_18 imamk11_2_18 imamk13_1_18 imamk13_2_18 imamk15_1_18
imamk15_2_18
imamk27_1_18 imamk29_1_18
imamk36_1_18 imamk36_2_18 imamk36_3_18
imamk47_18 imamk48_18 imamk50_18 imamk51_18
imamk61_1_1_18 imamk61_1_2_18
imamk61_2_1_18 imamk61_2_2_18
imamk61_3_1_18 imamk61_3_2_18
imamk61_4_1_18 imamk61_4_2_18
imamk80_1_1_18 imamk80_1_2_18 imamk80_3_18; run;
*** print imputed output: mean with zero;
Title "Group1 core pension - imputed (mean with zero)";
proc means mean std min max n nmiss data=imp1;
variable imamk11_1_15 imamk11_2_15 imamk13_1_15 imamk13_2_15 imamk15_1_15
imamk15_2_15
imamk27_1_15 imamk27_2_15 imamk29_1_15 imamk29_2_15 imamk36_1_15
imamk36_2_15 imamk36_3_15
imamk47_15 imamk48_15 imamk50_15 imamk51_15
imamk61_1_1_15 imamk61_1_2_15 imamk61_1_3_15
imamk61_2_1_15 imamk61_2_2_15 imamk61_2_3_15
imamk61_3_1_15 imamk61_3_2_15 imamk61_3_3_15
imamk61_4_1_15 imamk61_4_2_15 imamk61_4_3_15
imamk80_1_15 imamk80_2_15 imamk80_3_15; run;
run;
225
imput2015_group1_report
*** print output: mean without zero;
Title "Group1 core pension - imputed (mean without zero)";
data imp2; set imp1;
if imamk11_1_15 =0 then imamk11_1_15 =.;
if imamk11_2_15 =0 then imamk11_2_15 =.;
if imamk13_1_15 =0 then imamk13_1_15 =.;
if imamk13_2_15 =0 then imamk13_2_15 =.;
if imamk15_1_15 =0 then imamk15_1_15 =.;
if imamk15_2_15 =0 then imamk15_2_15 =.;
```

```
if imamk27_1_15 =0 then imamk27_1_15 =.;
if imamk27_2_15 =0 then imamk27_2_15 =.;
if imamk29_1_15 =0 then imamk29_1_15 =.;
if imamk29_2_15 =0 then imamk29_2_15 =.;
if imamk36_1_15 =0 then imamk36_1_15 =.;
if imamk36_2_15 =0 then imamk36_2_15 =.;
if imamk36_3_15 =0 then imamk36_3_15 =.;
if imamk47_15 =0 then imamk47_15 =.;
if imamk48_15 =0 then imamk48_15 =.;
if imamk50_15 =0 then imamk50_15 =.;
if imamk51_15 =0 then imamk51_15 =.;
if imamk61_1_1_15 =0 then imamk61_1_1_15 =.;
if imamk61_1_2_15 =0 then imamk61_1_2_15 =.;
if imamk61_1_3_15 =0 then imamk61_1_3_15 =.;
if imamk61_2_1_15 =0 then imamk61_2_1_15 =.;
if imamk61_2_2_15 =0 then imamk61_2_2_15 =.;
if imamk61_2_3_15 =0 then imamk61_2_3_15 =.;
if imamk61_3_1_15 =0 then imamk61_3_1_15 =.;
if imamk61_3_2_15 =0 then imamk61_3_2_15 =.;
if imamk61_3_3_15 =0 then imamk61_3_3_15 =.;
if imamk61_4_1_15 =0 then imamk61_4_1_15 =.;
if imamk61_4_2_15 =0 then imamk61_4_2_15 =.;
if imamk61_4_3_15 =0 then imamk61_4_3_15 =.;
if imamk80_1_15 =0 then imamk80_1_15=.;
if imamk80_2_15 =0 then imamk80_2_15=.;
if imamk80_3_15 =0 then imamk80_3_15=.; run;
proc means mean std min max n nmiss data=imp2;
variable imamk11_1_15 imamk11_2_15 imamk13_1_15 imamk13_2_15 imamk15_1_15
imamk15_2_15
imamk27_1_15 imamk27_2_15 imamk29_1_15 imamk29_2_15 imamk36_1_15
imamk36_2_15 imamk36_3_15
imamk47_15 imamk48_15 imamk50_15 imamk51_15
imamk61_1_1_15 imamk61_1_2_15 imamk61_1_3_15
imamk61_2_1_15 imamk61_2_2_15 imamk61_2_3_15
imamk61_3_1_15 imamk61_3_2_15 imamk61_3_3_15
imamk61_4_1_15 imamk61_4_2_15 imamk61_4_3_15
imamk80_1_15 imamk80_2_15 imamk80_3_15; run;
*/
```

GROUP 2. Spouse's

Total Income Components

```
/******************************************************/
/* PROGRAM NAME : Imput2018_group2_core_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 12/11/2020 */
/* Impute missing value on core and proxy questionnaire */
/******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

proc contents data=aa;
run;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k52b_18
k53_18 k53a_18 k53b1_18 k53b2_18 k53b3_18
k54_18 k54a_18 k54b1_18 k54b2_18 k54b3_18 k54a_monthly_18
k56_18 k56a_18 k56b1_18 k56b2_18 k56b3_18
k57_18 k57a_18 k57b1_18 k57b2_18 k57b3_18 k57a_monthly_18
k64c_18 k67_1_1_18 k68a1_1_18 k68b1_1_18 k68c1_1_18
k67_1_2_18 k68a1_2_18 k68b1_2_18 k68c1_2_18
k64d_18 k67_2_1_18 k68a2_1_18 k68b2_1_18 k68c2_1_18
k67_2_2_18 k68a2_2_18 k68b2_2_18 k68c2_2_18
k64e_18 k67_3_1_18 k68a3_1_18 k68b3_1_18 k68c3_1_18
k67_3_2_18 k68a3_2_18 k68b3_2_18 k68c3_2_18
k64f_18 k67_4_1_18 k68a4_1_18 k68b4_1_18 k68c4_1_18
k67_4_2_18 k68a4_2_18 k68b4_2_18 k68c4_2_18
k82c_18 k83_1_1_18 k83_1_2_18
k82e_18 k83_2_18
;
if tipent_hh_18 in (1) and k52b_18 ne .S; run;***** 5977;

/*proc freq data=aa2; table k52b_18; run;*/

data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamk53_18=k53a_18; **** Imputation N=244;
if k53_18 =2 and missing(k53a_18) then imamk53_18=0;
if missing(k53_18) and missing(k53a_18) then imamk53_18=0;
if k53_18 =1 and k53a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk53_18=.;
if missing(imamk53_18) and missing(k53b1_18) then k53b1_18=9;
imamk54_18=k54a_monthly_18;**** Imputation N=259;
if k54_18 =2 and missing(k54a_monthly_18) then imamk54_18=0;
if missing(k54_18) and missing(k54a_monthly_18) then imamk54_18=0;
```

```
if k54_18=1 and k54a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk54_18=.;
if missing(imamk54_18) and missing(k54b1_18) then k54b1_18=9;
imamk56_18=k56a_18;**** Imputation N=8;
if k56_18 =2 and missing(k56a_18) then imamk56_18=0;
if missing(k56_18) and missing(k56a_18) then imamk56_18=0;
if k56_18=1 and k56a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk56_18=.;
if missing(imamk56_18) and missing(k56b1_18) then k56b1_18=9;
imamk57_18=k57a_monthly_18;**** Imputation N=4;
if k57_18 =2 and missing(k57a_monthly_18) then imamk57_18=0;
if missing(k57_18) and missing(k57a_monthly_18) then imamk57_18=0;
if k57_18=1 and k57a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk57_18=.;
if missing(imamk57_18) and missing(k57b1_18) then k57b1_18=9;
dumk53_18=missing(imamk53_18);
dumk54_18=missing(imamk54_18);
dumk56_18=missing(imamk56_18);
dumk57_18=missing(imamk57_18);
run;
/*proc freq; table dumk53_18 dumk54_18 dumk56_18 dumk57_18;run;*/

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k53_18,k53b1_18,k53b2_18,k53b3_18,120000,7500,15000,2000,k53_18);
run;
```

```
%range(k54_18,k54b1_18,k54b2_18,k54b3_18, 50000,7500,15000,2000,k54_18);
run;
%range(k56_18,k56b1_18,k56b2_18,k56b3_18, 30000,7500,15000,2000,k56_18);
run;
%range(k57_18,k57b1_18,k57b2_18,k57b3_18, 50000,7500,15000,2000,k57_18);
run; *max=2500 < upper range of the bracket (15000), so use bonus from
primary job (k54) as reference;
/*proc means data=aa2;var imamk53_18 imamk54_18 imamk56_18 imamk57_18;run;*/

************ 1 ***************;
data output.group2_core_pension1;
merge datak53_18(drop=k53_18)
datak54_18(drop=k54_18)
datak56_18(drop=k56_18)
datak57_18(drop=k57_18) ;
by cunicah subhog_18; run; ****5,977 var=22;
data dd1; set output.group2_core_pension1; run; **** Core nonproxy N=5,977 ;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk53_18 imamk54_18 imamk56_18 imamk57_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk53_18 upk53_18
lowk54_18 upk54_18
lowk56_18 upk56_18
lowk57_18 upk57_18
dumk53_18
dumk54_18
dumk56_18
dumk57_18
;
bounds
imamk53_18 (>=lowk53_18 ,<=upk53_18)
imamk54_18 (>=lowk54_18 ,<=upk54_18)
imamk56_18 (>=lowk56_18 ,<=upk56_18)
imamk57_18 (>=lowk57_18 ,<=upk57_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;
```

```
data imp.group2_core_pension1_imputed; set dd_1;
drop
lowk53_18 upk53_18
lowk54_18 upk54_18
lowk56_18 upk56_18
lowk57_18 upk57_18
; run;

/* data temp; set imp.group2_core_pension1_imputed; run;
proc freq; table imamk53_18; where dumk53_18=1; run;
proc freq; table imamk54_18; where dumk54_18=1; run;
proc freq; table imamk56_18; where dumk56_18=1; run;
proc freq; table imamk57_18; where dumk57_18=1; run; */

********** 2 ***********************;

data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamk67_1_1_18=k67_1_1_18;**** Imputation N=468;
if k64c_18 =2 and missing(k67_1_1_18) then imamk67_1_1_18=0;
if missing(k64c_18) and missing(k67_1_1_18) then imamk67_1_1_18=0;
if k64c_18=1 and k67_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_1_1_18=.;
if missing(imamk67_1_1_18) and missing(k68a1_1_18) then k68a1_1_18=9;
imamk67_1_2_18=k67_1_2_18;**** Imputation N=5;
if k64c_18 in (2,8,9) and missing(k67_1_2_18) then imamk67_1_2_18=0;
if missing(k64c_18) and missing(k67_1_2_18) then imamk67_1_2_18=0;
if k64c_18 = 1 and k67_1_2_18=. then imamk67_1_2_18=0;
if k64c_18 = 1 and k67_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_1_2_18=.;
if missing(imamk67_1_2_18) and missing(k68a1_2_18) then k68a1_2_18=9;
imamk67_2_1_18=k67_2_1_18;**** Imputation N=302;
if k64d_18 =2 and missing(k67_2_1_18) then imamk67_2_1_18=0;
if missing(k64d_18) and missing(k67_2_1_18) then imamk67_2_1_18=0;
if k64d_18=1 and k67_2_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_2_1_18=.;
if missing(imamk67_2_1_18) and missing(k68a2_1_18) then k68a2_1_18=9;
imamk67_2_2_18=k67_2_2_18;**** Imputation N=1;
if k64d_18 in (2,8,9) and missing(k67_2_2_18) then imamk67_2_2_18=0;
if missing(k64d_18) and missing(k67_2_2_18) then imamk67_2_2_18=0;
if k64d_18 = 1 and k67_2_2_18=. then imamk67_2_2_18=0;
if k64d_18 = 1 and k67_2_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_2_2_18=.;
if missing(imamk67_2_2_18) and missing(k68a2_2_18) then k68a2_2_18=9;
imamk67_3_1_18=k67_3_1_18;**** Imputation N=308;
if k64e_18 =2 and missing(k67_3_1_18) then imamk67_3_1_18=0;
if missing(k64e_18) and missing(k67_3_1_18) then imamk67_3_1_18=0;
```

```
if k64e_18=1 and k67_3_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_3_1_18=.;
if missing(imamk67_3_1_18) and missing(k68a3_1_18) then k68a3_1_18=9;
imamk67_3_2_18=k67_3_2_18;**** Imputation N=3;
if k64e_18 in (2,8,9) and missing(k67_3_2_18) then imamk67_3_2_18=0;
if missing(k64e_18) and missing(k67_3_2_18) then imamk67_3_2_18=0;
if k64e_18 = 1 and k67_3_2_18=. then imamk67_3_2_18=0;
if k64e_18 = 1 and k67_3_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_3_2_18=.;
if missing(imamk67_3_2_18) and missing(k68a3_2_18) then k68a3_2_18=9;
imamk67_4_1_18=k67_4_1_18;**** Imputation N=307;
if k64f_18 =2 and missing(k67_4_1_18) then imamk67_4_1_18=0;
if missing(k64f_18) and missing(k67_4_1_18) then imamk67_4_1_18=0;
if k64f_18=1 and k67_4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_4_1_18=.;
if missing(imamk67_4_1_18) and missing(k68a4_1_18) then k68a4_1_18=9;
imamk67_4_2_18=k67_4_2_18;**** Imputation N=6;
if k64f_18 in (2,8,9) and missing(k67_4_2_18) then imamk67_4_2_18=0;
if missing(k64f_18) and missing(k67_4_2_18) then imamk67_4_2_18=0;
if k64f_18 = 1 and k67_4_2_18=. then imamk67_4_2_18=0;
if k64f_18 = 1 and k67_4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_4_2_18=.;
if missing(imamk67_4_2_18) and missing(k68a4_2_18) then k68a4_2_18=9;
k67_1_1_imp_18=missing(imamk67_1_1_18);
k67_1_2_imp_18=missing(imamk67_1_2_18);
k67_2_1_imp_18=missing(imamk67_2_1_18);
k67_2_2_imp_18=missing(imamk67_2_2_18);
k67_3_1_imp_18=missing(imamk67_3_1_18);
k67_3_2_imp_18=missing(imamk67_3_2_18);
k67_4_1_imp_18=missing(imamk67_4_1_18);
k67_4_2_imp_18=missing(imamk67_4_2_18);
run;

/* proc freq; table imamk67_1_1_18
imamk67_1_2_18
imamk67_2_1_18
imamk67_2_2_18
imamk67_3_1_18
imamk67_3_2_18
imamk67_4_1_18
imamk67_4_2_18; run; */

%range(k67_1_1_18,k68a1_1_18,k68b1_1_18,k68c1_1_18,80000,2000,7500,950,k64c_
18);run;
%range(k67_1_2_18,k68a1_2_18,k68b1_2_18,k68c1_2_18,16000,2000,7500,950);
run;
%range(k67_2_1_18,k68a2_1_18,k68b2_1_18,k68c2_1_18,22000,2000,7500,950,k64d_
18);run;
```

```
%range(k67_2_2_18,k68a2_2_18,k68b2_2_18,k68c2_2_18,22000,2000,7500,950);
run; *max=0, so use max value of k67_2_1_18;
%range(k67_3_1_18,k68a3_1_18,k68b3_1_18,k68c3_1_18,25000,2000,7500,950,k64e_
18);run;
%range(k67_3_2_18,k68a3_2_18,k68b3_2_18,k68c3_2_18,25000,2000,7500,950);
run; *max=0, so use max value of k67_3_1_18;
%range(k67_4_1_18,k68a4_1_18,k68b4_1_18,k68c4_1_18,30000,2000,7500,950,k64f_
18);run;
%range(k67_4_2_18,k68a4_2_18,k68b4_2_18,k68c4_2_18,30000,2000,7500,950);
run;*max=0, so use max value of k67_4_1_18;

/* proc means; var imamk67_1_1_18
imamk67_1_2_18
imamk67_2_1_18
imamk67_2_2_18
imamk67_3_1_18
imamk67_3_2_18
imamk67_4_1_18
imamk67_4_2_18; run; */

data output.group2_core_pension2;
merge datak67_1_1_18(drop=k64c_18) datak67_1_2_18
datak67_2_1_18(drop=k64d_18) datak67_2_2_18
datak67_3_1_18(drop=k64e_18) datak67_3_2_18
datak67_4_1_18(drop=k64f_18) datak67_4_2_18 ;
by cunicah subhog_18; run; ****5977 var=38;

data dd1; set output.group2_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_1_1_18 lowk67_1_1_18 upk67_1_1_18 k67_1_1_imp_18
imamk67_1_2_18 lowk67_1_2_18 upk67_1_2_18 k67_1_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk67_1_1_18 imamk67_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_1_1_18 upk67_1_1_18
lowk67_1_2_18 upk67_1_2_18
k67_1_1_imp_18
k67_1_2_imp_18
;
bounds
imamk67_1_1_18 (>=lowk67_1_1_18 ,<=upk67_1_1_18)
imamk67_1_2_18 (>=lowk67_1_2_18 ,<=upk67_1_2_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_2_1_18 lowk67_2_1_18 upk67_2_1_18 k67_2_1_imp_18
imamk67_2_2_18 lowk67_2_2_18 upk67_2_2_18 k67_2_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk67_2_1_18 imamk67_2_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_2_1_18 upk67_2_1_18
lowk67_2_2_18 upk67_2_2_18
k67_2_1_imp_18
k67_2_2_imp_18
;
bounds
imamk67_2_1_18 (>=lowk67_2_1_18 ,<=upk67_2_1_18)
imamk67_2_2_18 (>=lowk67_2_2_18 ,<=upk67_2_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_3_1_18 lowk67_3_1_18 upk67_3_1_18 k67_3_1_imp_18
imamk67_3_2_18 lowk67_3_2_18 upk67_3_2_18 k67_3_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
```

```
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk67_3_1_18 imamk67_3_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_3_1_18 upk67_3_1_18
lowk67_3_2_18 upk67_3_2_18
k67_3_1_imp_18
k67_3_2_imp_18
;
bounds
imamk67_3_1_18 (>=lowk67_3_1_18 ,<=upk67_3_1_18)
imamk67_3_2_18 (>=lowk67_3_2_18 ,<=upk67_3_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;


data dd1; set output.group2_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_4_1_18 lowk67_4_1_18 upk67_4_1_18 k67_4_1_imp_18
imamk67_4_2_18 lowk67_4_2_18 upk67_4_2_18 k67_4_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_4;
categorical sex_18 ;
count age_18;
mixed imamk67_4_1_18 imamk67_4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_4_1_18 upk67_4_1_18
lowk67_4_2_18 upk67_4_2_18
k67_4_1_imp_18
k67_4_2_imp_18
;
bounds
imamk67_4_1_18 (>=lowk67_4_1_18 ,<=upk67_4_1_18)
imamk67_4_2_18 (>=lowk67_4_2_18 ,<=upk67_4_2_18)
yrschool(<=22, >=0)
```

```
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group2_core_pension2_imputed;
merge dd_1 dd_2 dd_3 dd_4;
by cunicah subhog_18;
drop
lowk67_1_1_18 upk67_1_1_18
lowk67_1_2_18 upk67_1_2_18
lowk67_2_1_18 upk67_2_1_18
lowk67_2_2_18 upk67_2_2_18
lowk67_3_1_18 upk67_3_1_18
lowk67_3_2_18 upk67_3_2_18
lowk67_4_1_18 upk67_4_1_18
lowk67_4_2_18 upk67_4_2_18;
run;

************** 3 ****************;

data aa2; set aa1;
imamk83_1_1_18=k83_1_1_18; **** Imputation N=359; **** nobrackets;
if k82c_18 =2 and missing(k83_1_1_18) then imamk83_1_1_18=0;
if missing(k82c_18) and missing(k83_1_1_18) then imamk83_1_1_18=0;
if k82c_18=1 and k83_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk83_1_1_18=.;
imamk83_2_18=k83_2_18; **** Imputation N=307;**** nobrackets;
if k82e_18 =2 and missing(k83_2_18) then imamk83_2_18=0;
if missing(k82e_18) and missing(k83_2_18) then imamk83_2_18=0;
if k82e_18=1 and k83_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk83_2_18=.;
imamk83_1_2_18=k83_1_2_18; **** Imputation N=28; **** nobrackets;
if k82c_18 in (2,8,9) and missing(k83_1_2_18) then imamk83_1_2_18=0;
if missing(k82c_18) and missing(k83_1_2_18) then imamk83_1_2_18=0;
if k82c_18=1 and k83_1_2_18=. then imamk83_1_2_18=0;
if k82c_18=1 and k83_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk83_1_2_18=.;
k83_1_1_imp_18=missing(imamk83_1_1_18);
k83_1_2_imp_18=missing(imamk83_1_2_18);
k83_2_imp_18=missing(imamk83_2_18);
run;
/*
proc freq data=aa2;
tables k83_1_1_imp_18 k83_1_2_imp_18 k83_2_imp_18;
run;
```

```
proc means data=aa2;
var imamk83_1_1_18 imamk83_1_2_18 imamk83_2_18;
run;
*/

data datak83; set aa2(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18
age_18 imamk83_1_1_18 imamk83_1_2_18 imamk83_2_18 k82c_18 k82e_18
k83_1_1_imp_18 k83_1_2_imp_18 k83_2_imp_18);
lowk83_1_1_18=1; upk83_1_1_18=80000;
if k82c_18 in (8,9) then lowk83_1_1_18=0;
lowk83_1_2_18=1; upk83_1_2_18=2500;
lowk83_2_18=1; upk83_2_18=1500000;
if k82e_18 in (8,9) then lowk83_2_18=0;
if imamk83_1_1_18 >=0 then do; lowk83_1_1_18=imamk83_1_1_18;
upk83_1_1_18=imamk83_1_1_18; end;
if imamk83_1_2_18 >=0 then do; lowk83_1_2_18=imamk83_1_2_18;
upk83_1_2_18=imamk83_1_2_18; end;
if imamk83_2_18 >=0 then do; lowk83_2_18=imamk83_2_18;
upk83_2_18=imamk83_2_18; end;
run;
data output.group2_core_pension3;
set datak83(drop=k82c_18 k82e_18);
by cunicah subhog_18; run;****5,977 var=18;

data dd1; set output.group2_core_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk83_1_1_18 lowk83_1_1_18 upk83_1_1_18 k83_1_1_imp_18
imamk83_1_2_18 lowk83_1_2_18 upk83_1_2_18 k83_1_2_imp_18
; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk83_1_1_18 imamk83_1_2_18  yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk83_1_1_18 upk83_1_1_18
lowk83_1_2_18 upk83_1_2_18
k83_1_1_imp_18
k83_1_2_imp_18
;
bounds
imamk83_1_1_18 (>=lowk83_1_1_18 ,<=upk83_1_1_18)
imamk83_1_2_18 (>=lowk83_1_2_18 ,<=upk83_1_2_18)
yrschool(<=22, >=0)
```

```
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_core_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk83_2_18 lowk83_2_18 upk83_2_18 k83_2_imp_18
; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk83_2_18  yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk83_2_18 upk83_2_18
k83_2_imp_18
;
bounds
imamk83_2_18 (>=lowk83_2_18 ,<=upk83_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group2_core_pension3_imputed; merge dd_1 dd_2; by cunicah
subhog_18;
drop
lowk83_1_1_18 upk83_1_1_18
lowk83_1_2_18 upk83_1_2_18
lowk83_2_18 upk83_2_18;
run;

/* data temp; set imp.group2_core_pension3_imputed; run;
proc freq; table imamk83_1_1_18; where k83_1_1_imp_18=1; run; **** imputed;
proc freq; table imamk83_1_2_18; where k83_1_2_imp_18=1; run; *** not
imputed;
```

```
proc freq; table imamk83_2_18; where k83_2_imp_18=1; run; **** not imputed;
*/
```

```
/********************************************************/
/* PROGRAM NAME : Imput2018_group2_proxy_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 12/14/2020 */
/* Impute missing value on proxy and proxy questionnaire */
/********************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k52b_18
k53_18 k53a_18 k53b1_18 k53b2_18 k53b3_18
k54_18 k54a_18 k54b1_18 k54b2_18 k54b3_18 k54a_monthly_18
k56_18 k56a_18 k56b1_18 k56b2_18 k56b3_18
k57_18 k57a_18 k57b1_18 k57b2_18 k57b3_18 k57a_monthly_18
k64c_18 k67_1_1_18 k68a1_1_18 k68b1_1_18 k68c1_1_18
k67_1_2_18 k68a1_2_18 k68b1_2_18 k68c1_2_18
k64d_18 k67_2_1_18 k68a2_1_18 k68b2_1_18 k68c2_1_18
k67_2_2_18 k68a2_2_18 k68b2_2_18 k68c2_2_18
k64e_18 k67_3_1_18 k68a3_1_18 k68b3_1_18 k68c3_1_18
k67_3_2_18 k68a3_2_18 k68b3_2_18 k68c3_2_18
k64f_18 k67_4_1_18 k68a4_1_18 k68b4_1_18 k68c4_1_18
k67_4_2_18 k68a4_2_18 k68b4_2_18 k68c4_2_18
k82c_18 k83_1_1_18 k83_1_2_18
k82e_18 k83_2_18
;
if tipent_hh_18 in (2) and k52b_18 ne .S; run;***** 122;

/*proc freq data=aa1; table k52b_18; run;*/

data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamk53_18=k53a_18; **** Imputation N=4;
if k53_18 =2 and missing(k53a_18) then imamk53_18=0;
if missing(k53_18) and missing(k53a_18) then imamk53_18=0;
if k53_18 =1 and k53a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk53_18=.;
if missing(imamk53_18) and missing(k53b1_18) then k53b1_18=9;
imamk54_18=k54a_monthly_18;**** Imputation N=3;
if k54_18 =2 and missing(k54a_monthly_18) then imamk54_18=0;
if missing(k54_18) and missing(k54a_monthly_18) then imamk54_18=0;
if k54_18=1 and k54a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk54_18=.;
```

```
if missing(imamk54_18) and missing(k54b1_18) then k54b1_18=9;
imamk56_18=k56a_18;**** Imputation N=0;
if k56_18 =2 and missing(k56a_18) then imamk56_18=0;
if missing(k56_18) and missing(k56a_18) then imamk56_18=0;
if k56_18=1 and k56a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk56_18=.;
if missing(imamk56_18) and missing(k56b1_18) then k56b1_18=9;
imamk57_18=k57a_monthly_18;**** Imputation N=0;
if k57_18 =2 and missing(k57a_monthly_18) then imamk57_18=0;
if missing(k57_18) and missing(k57a_monthly_18) then imamk57_18=0;
if k57_18=1 and k57a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk57_18=.;
if missing(imamk57_18) and missing(k57b1_18) then k57b1_18=9;
dumk53_18=missing(imamk53_18);
dumk54_18=missing(imamk54_18);
dumk56_18=missing(imamk56_18);
dumk57_18=missing(imamk57_18);
run;
/*proc freq; table dumk53_18 dumk54_18 dumk56_18 dumk57_18;run;*/

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k53_18,k53b1_18,k53b2_18,k53b3_18,120000,7500,15000,2000,k53_18);
run;
%range(k54_18,k54b1_18,k54b2_18,k54b3_18, 50000,7500,15000,2000,k54_18);
run;
```

```
%range(k56_18,k56b1_18,k56b2_18,k56b3_18, 30000,7500,15000,2000,k56_18);
run; *imp n=0;
%range(k57_18,k57b1_18,k57b2_18,k57b3_18, 50000,7500,15000,2000,k57_18);
run; *imp n=0;
/*proc means data=aa2;var imamk53_18 imamk54_18 imamk56_18 imamk57_18;run;*/

************ 1 ***************;
data output.group2_proxy_pension1;
merge datak53_18(drop=k53_18)
datak54_18(drop=k54_18)
datak56_18(drop=k56_18)
datak57_18(drop=k57_18) ;
by cunicah subhog_18; run; ****122 var=22;
data dd1; set output.group2_proxy_pension1; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk53_18 imamk54_18 imamk56_18 imamk57_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk53_18 upk53_18
lowk54_18 upk54_18
lowk56_18 upk56_18
lowk57_18 upk57_18
dumk53_18
dumk54_18
dumk56_18
dumk57_18
;
bounds
imamk53_18 (>=lowk53_18 ,<=upk53_18)
imamk54_18 (>=lowk54_18 ,<=upk54_18)
imamk56_18 (>=lowk56_18 ,<=upk56_18)
imamk57_18 (>=lowk57_18 ,<=upk57_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data imp.group2_proxy_pension1_imputed; set dd_1;
drop
```

```
lowk53_18 upk53_18
lowk54_18 upk54_18
lowk56_18 upk56_18
lowk57_18 upk57_18
; run;

/* data temp; set imp.group2_proxy_pension1_imputed; run;
proc freq; table imamk53_18; where dumk53_18=1; run;
proc freq; table imamk54_18; where dumk54_18=1; run;
proc freq; table imamk56_18; where dumk56_18=1; run;
proc freq; table imamk57_18; where dumk57_18=1; run; */


*********** 2 **********************;

data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamk67_1_1_18=k67_1_1_18;**** Imputation N=7;
if k64c_18 =2 and missing(k67_1_1_18) then imamk67_1_1_18=0;
if missing(k64c_18) and missing(k67_1_1_18) then imamk67_1_1_18=0;
if k64c_18=1 and k67_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_1_1_18=.;
if missing(imamk67_1_1_18) and missing(k68a1_1_18) then k68a1_1_18=9;
imamk67_1_2_18=k67_1_2_18;**** Imputation N=0;
if k64c_18 in (2,8,9) and missing(k67_1_2_18) then imamk67_1_2_18=0;
if missing(k64c_18) and missing(k67_1_2_18) then imamk67_1_2_18=0;
if k64c_18 = 1 and k67_1_2_18=. then imamk67_1_2_18=0;
if k64c_18 = 1 and k67_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_1_2_18=.;
if missing(imamk67_1_2_18) and missing(k68a1_2_18) then k68a1_2_18=9;
imamk67_2_1_18=k67_2_1_18;**** Imputation N=3;
if k64d_18 =2 and missing(k67_2_1_18) then imamk67_2_1_18=0;
if missing(k64d_18) and missing(k67_2_1_18) then imamk67_2_1_18=0;
if k64d_18=1 and k67_2_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_2_1_18=.;
if missing(imamk67_2_1_18) and missing(k68a2_1_18) then k68a2_1_18=9;
imamk67_2_2_18=k67_2_2_18;**** Imputation N=0;
if k64d_18 in (2,8,9) and missing(k67_2_2_18) then imamk67_2_2_18=0;
if missing(k64d_18) and missing(k67_2_2_18) then imamk67_2_2_18=0;
if k64d_18 = 1 and k67_2_2_18=. then imamk67_2_2_18=0;
if k64d_18 = 1 and k67_2_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_2_2_18=.;
if missing(imamk67_2_2_18) and missing(k68a2_2_18) then k68a2_2_18=9;
imamk67_3_1_18=k67_3_1_18;**** Imputation N=3;
if k64e_18 =2 and missing(k67_3_1_18) then imamk67_3_1_18=0;
if missing(k64e_18) and missing(k67_3_1_18) then imamk67_3_1_18=0;
```

```
if k64e_18=1 and k67_3_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_3_1_18=.;
if missing(imamk67_3_1_18) and missing(k68a3_1_18) then k68a3_1_18=9;
imamk67_3_2_18=k67_3_2_18;**** Imputation N=0;
if k64e_18 in (2,8,9) and missing(k67_3_2_18) then imamk67_3_2_18=0;
if missing(k64e_18) and missing(k67_3_2_18) then imamk67_3_2_18=0;
if k64e_18 = 1 and k67_3_2_18=. then imamk67_3_2_18=0;
if k64e_18 = 1 and k67_3_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_3_2_18=.;
if missing(imamk67_3_2_18) and missing(k68a3_2_18) then k68a3_2_18=9;
imamk67_4_1_18=k67_4_1_18;**** Imputation N=3;
if k64f_18 =2 and missing(k67_4_1_18) then imamk67_4_1_18=0;
if missing(k64f_18) and missing(k67_4_1_18) then imamk67_4_1_18=0;
if k64f_18=1 and k67_4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_4_1_18=.;
if missing(imamk67_4_1_18) and missing(k68a4_1_18) then k68a4_1_18=9;
imamk67_4_2_18=k67_4_2_18;**** Imputation N=0;
if k64f_18 in (2,8,9) and missing(k67_4_2_18) then imamk67_4_2_18=0;
if missing(k64f_18) and missing(k67_4_2_18) then imamk67_4_2_18=0;
if k64f_18 = 1 and k67_4_2_18=. then imamk67_4_2_18=0;
if k64f_18 = 1 and k67_4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk67_4_2_18=.;
if missing(imamk67_4_2_18) and missing(k68a4_2_18) then k68a4_2_18=9;
k67_1_1_imp_18=missing(imamk67_1_1_18);
k67_1_2_imp_18=missing(imamk67_1_2_18);
k67_2_1_imp_18=missing(imamk67_2_1_18);
k67_2_2_imp_18=missing(imamk67_2_2_18);
k67_3_1_imp_18=missing(imamk67_3_1_18);
k67_3_2_imp_18=missing(imamk67_3_2_18);
k67_4_1_imp_18=missing(imamk67_4_1_18);
k67_4_2_imp_18=missing(imamk67_4_2_18);
run;

/* proc freq; table imamk67_1_1_18
imamk67_1_2_18
imamk67_2_1_18
imamk67_2_2_18
imamk67_3_1_18
imamk67_3_2_18
imamk67_4_1_18
imamk67_4_2_18; run; */

%range(k67_1_1_18,k68a1_1_18,k68b1_1_18,k68c1_1_18,80000,2000,7500,950,k64c_
18);run;
%range(k67_1_2_18,k68a1_2_18,k68b1_2_18,k68c1_2_18,16000,2000,7500,950);
run;*imp n=0;
%range(k67_2_1_18,k68a2_1_18,k68b2_1_18,k68c2_1_18,22000,2000,7500,950,k64d_
18);run;
```

```
%range(k67_2_2_18,k68a2_2_18,k68b2_2_18,k68c2_2_18,22000,2000,7500,950);
run; *imp n=0;
%range(k67_3_1_18,k68a3_1_18,k68b3_1_18,k68c3_1_18,25000,2000,7500,950,k64e_
18);run;
%range(k67_3_2_18,k68a3_2_18,k68b3_2_18,k68c3_2_18,25000,2000,7500,950);
run; *imp n=0;
%range(k67_4_1_18,k68a4_1_18,k68b4_1_18,k68c4_1_18,30000,2000,7500,950,k64f_
18);run;
%range(k67_4_2_18,k68a4_2_18,k68b4_2_18,k68c4_2_18,30000,2000,7500,950);
run;*imp n=0;

/* proc means; var imamk67_1_1_18
imamk67_1_2_18
imamk67_2_1_18
imamk67_2_2_18
imamk67_3_1_18
imamk67_3_2_18
imamk67_4_1_18
imamk67_4_2_18; run; */

data output.group2_proxy_pension2;
merge datak67_1_1_18(drop=k64c_18) datak67_1_2_18
datak67_2_1_18(drop=k64d_18) datak67_2_2_18
datak67_3_1_18(drop=k64e_18) datak67_3_2_18
datak67_4_1_18(drop=k64f_18) datak67_4_2_18 ;
by cunicah subhog_18; run; ****122 var=38;

data dd1; set output.group2_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_1_1_18 lowk67_1_1_18 upk67_1_1_18 k67_1_1_imp_18
imamk67_1_2_18 lowk67_1_2_18 upk67_1_2_18 k67_1_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk67_1_1_18 imamk67_1_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_1_1_18 upk67_1_1_18
lowk67_1_2_18 upk67_1_2_18
k67_1_1_imp_18
k67_1_2_imp_18
;
bounds
imamk67_1_1_18 (>=lowk67_1_1_18 ,<=upk67_1_1_18)
imamk67_1_2_18 (>=lowk67_1_2_18 ,<=upk67_1_2_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_2_1_18 lowk67_2_1_18 upk67_2_1_18 k67_2_1_imp_18
imamk67_2_2_18 lowk67_2_2_18 upk67_2_2_18 k67_2_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk67_2_1_18 imamk67_2_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_2_1_18 upk67_2_1_18
lowk67_2_2_18 upk67_2_2_18
k67_2_1_imp_18
k67_2_2_imp_18
;
bounds
imamk67_2_1_18 (>=lowk67_2_1_18 ,<=upk67_2_1_18)
imamk67_2_2_18 (>=lowk67_2_2_18 ,<=upk67_2_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_3_1_18 lowk67_3_1_18 upk67_3_1_18 k67_3_1_imp_18
imamk67_3_2_18 lowk67_3_2_18 upk67_3_2_18 k67_3_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
```

```
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk67_3_1_18 imamk67_3_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_3_1_18 upk67_3_1_18
lowk67_3_2_18 upk67_3_2_18
k67_3_1_imp_18
k67_3_2_imp_18
;
bounds
imamk67_3_1_18 (>=lowk67_3_1_18 ,<=upk67_3_1_18)
imamk67_3_2_18 (>=lowk67_3_2_18 ,<=upk67_3_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;


data dd1; set output.group2_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk67_4_1_18 lowk67_4_1_18 upk67_4_1_18 k67_4_1_imp_18
imamk67_4_2_18 lowk67_4_2_18 upk67_4_2_18 k67_4_2_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_4;
categorical sex_18 ;
count age_18;
mixed imamk67_4_1_18 imamk67_4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk67_4_1_18 upk67_4_1_18
lowk67_4_2_18 upk67_4_2_18
k67_4_1_imp_18
k67_4_2_imp_18
;
bounds
imamk67_4_1_18 (>=lowk67_4_1_18 ,<=upk67_4_1_18)
imamk67_4_2_18 (>=lowk67_4_2_18 ,<=upk67_4_2_18)
yrschool(<=22, >=0)
```

```
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group2_proxy_pension2_imputed;
merge dd_1 dd_2 dd_3 dd_4;
by cunicah subhog_18;
drop
lowk67_1_1_18 upk67_1_1_18
lowk67_1_2_18 upk67_1_2_18
lowk67_2_1_18 upk67_2_1_18
lowk67_2_2_18 upk67_2_2_18
lowk67_3_1_18 upk67_3_1_18
lowk67_3_2_18 upk67_3_2_18
lowk67_4_1_18 upk67_4_1_18
lowk67_4_2_18 upk67_4_2_18;
run;

************** 3 ****************;

data aa2; set aa1;
imamk83_1_1_18=k83_1_1_18; **** Imputation N=4; **** nobrackets;
if k82c_18 =2 and missing(k83_1_1_18) then imamk83_1_1_18=0;
if missing(k82c_18) and missing(k83_1_1_18) then imamk83_1_1_18=0;
if k82c_18=1 and k83_1_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk83_1_1_18=.;
imamk83_2_18=k83_2_18; **** Imputation N=3;**** nobrackets;
if k82e_18 =2 and missing(k83_2_18) then imamk83_2_18=0;
if missing(k82e_18) and missing(k83_2_18) then imamk83_2_18=0;
if k82e_18=1 and k83_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk83_2_18=.;
imamk83_1_2_18=k83_1_2_18; **** Imputation N=0; **** nobrackets;
if k82c_18 in (2,8,9) and missing(k83_1_2_18) then imamk83_1_2_18=0;
if missing(k82c_18) and missing(k83_1_2_18) then imamk83_1_2_18=0;
if k82c_18=1 and k83_1_2_18=. then imamk83_1_2_18=0;
if k82c_18=1 and k83_1_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk83_1_2_18=.;
k83_1_1_imp_18=missing(imamk83_1_1_18);
k83_1_2_imp_18=missing(imamk83_1_2_18);
k83_2_imp_18=missing(imamk83_2_18);
run;
/*
proc freq data=aa2;
tables k83_1_1_imp_18 k83_1_2_imp_18 k83_2_imp_18;
run;
```

```
proc means data=aa2;
var imamk83_1_1_18 imamk83_1_2_18 imamk83_2_18;
run;
*/

data datak83; set aa2(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18
age_18 imamk83_1_1_18 imamk83_1_2_18 imamk83_2_18 k82c_18 k82e_18
k83_1_1_imp_18 k83_1_2_imp_18 k83_2_imp_18);
lowk83_1_1_18=1; upk83_1_1_18=80000;
if k82c_18 in (8,9) then lowk83_1_1_18=0;
lowk83_1_2_18=1; upk83_1_2_18=2500;
lowk83_2_18=1; upk83_2_18=1500000;
if k82e_18 in (8,9) then lowk83_2_18=0;
if imamk83_1_1_18 >=0 then do; lowk83_1_1_18=imamk83_1_1_18;
upk83_1_1_18=imamk83_1_1_18; end;
if imamk83_1_2_18 >=0 then do; lowk83_1_2_18=imamk83_1_2_18;
upk83_1_2_18=imamk83_1_2_18; end;
if imamk83_2_18 >=0 then do; lowk83_2_18=imamk83_2_18;
upk83_2_18=imamk83_2_18; end;
run;
data output.group2_proxy_pension3;
set datak83(drop=k82c_18 k82e_18);
by cunicah subhog_18; run;****122 var=18;

data dd1; set output.group2_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk83_1_1_18 lowk83_1_1_18 upk83_1_1_18 k83_1_1_imp_18
imamk83_1_2_18 lowk83_1_2_18 upk83_1_2_18 k83_1_2_imp_18
; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk83_1_1_18 imamk83_1_2_18  yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk83_1_1_18 upk83_1_1_18
lowk83_1_2_18 upk83_1_2_18
k83_1_1_imp_18
k83_1_2_imp_18
;
bounds
imamk83_1_1_18 (>=lowk83_1_1_18 ,<=upk83_1_1_18)
imamk83_1_2_18 (>=lowk83_1_2_18 ,<=upk83_1_2_18)
yrschool(<=22, >=0)
```

```
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group2_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk83_2_18 lowk83_2_18 upk83_2_18 k83_2_imp_18
; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk83_2_18  yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk83_2_18 upk83_2_18
k83_2_imp_18
;
bounds
imamk83_2_18 (>=lowk83_2_18 ,<=upk83_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group2_proxy_pension3_imputed; merge dd_1 dd_2; by cunicah
subhog_18;
drop
lowk83_1_1_18 upk83_1_1_18
lowk83_1_2_18 upk83_1_2_18
lowk83_2_18 upk83_2_18;
run;

/* data temp; set imp.group2_proxy_pension3_imputed; run;
proc freq; table imamk83_1_1_18; where k83_1_1_imp_18=1; run; **** imputed;
proc freq; table imamk83_1_2_18; where k83_1_2_imp_18=1; run; *** not
imputed;
```

```
proc freq; table imamk83_2_18; where k83_2_imp_18=1; run; **** not imputed;
*/
```

```
/********************************************************/
/* PROGRAM NAME : Imput2018_group2_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 12/14/2020 */
/*
*/
/********************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

************* core/pension ***********************;
data out1;
merge output.Group2_core_pension1 output.Group2_core_pension2
output.group2_core_pension3;
by cunicah subhog_18;
rename imamk53_18=amk53_18 imamk54_18=amk54_18 imamk56_18=amk56_18
imamk57_18=amk57_18
imamk67_1_1_18=amk67_1_1_18 imamk67_1_2_18=amk67_1_2_18
imamk67_2_1_18=amk67_2_1_18 imamk67_2_2_18=amk67_2_2_18
imamk67_3_1_18=amk67_3_1_18 imamk67_3_2_18=amk67_3_2_18
imamk67_4_1_18=amk67_4_1_18 imamk67_4_2_18=amk67_4_2_18
imamk83_1_1_18=amk83_1_1_18 imamk83_1_2_18=amk83_1_2_18
imamk83_2_18=amk83_2_18;run;

data imp1;
merge imp.Group2_core_pension1_imputed imp.Group2_core_pension2_imputed
imp.Group2_core_pension3_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group2 core pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk53_18 imamk53_18 amk54_18 imamk54_18 amk56_18 imamk56_18
amk57_18 imamk57_18
amk67_1_1_18 imamk67_1_1_18 amk67_1_2_18 imamk67_1_2_18
amk67_2_1_18 imamk67_2_1_18 amk67_2_2_18 imamk67_2_2_18
amk67_3_1_18 imamk67_3_1_18 amk67_3_2_18 imamk67_3_2_18
amk67_4_1_18 imamk67_4_1_18 amk67_4_2_18 imamk67_4_2_18
amk83_1_1_18 imamk83_1_1_18 amk83_1_2_18 imamk83_1_2_18 amk83_2_18
imamk83_2_18
; run;

Title "Group2 core pension - mean without zero";
data out_imp2; set out_imp1;
if imamk53_18 =0 then imamk53_18 =.;
if imamk54_18 =0 then imamk54_18 =.;
if imamk56_18 =0 then imamk56_18 =.;
```

```
if imamk57_18 =0 then imamk57_18 =.;
if imamk67_1_1_18 =0 then imamk67_1_1_18 =.;
if imamk67_1_2_18 =0 then imamk67_1_2_18 =.;
if imamk67_2_1_18 =0 then imamk67_2_1_18 =.;
if imamk67_2_2_18 =0 then imamk67_2_2_18 =.;
if imamk67_3_1_18 =0 then imamk67_3_1_18 =.;
if imamk67_3_2_18 =0 then imamk67_3_2_18 =.;
if imamk67_4_1_18 =0 then imamk67_4_1_18 =.;
if imamk67_4_2_18 =0 then imamk67_4_2_18 =.;
if imamk83_1_1_18 =0 then imamk83_1_1_18 =.;
if imamk83_1_2_18 =0 then imamk83_1_2_18 =.;
if imamk83_2_18 =0 then imamk83_2_18 =.;

if amk53_18 =0 then amk53_18 =.;
if amk54_18 =0 then amk54_18 =.;
if amk56_18 =0 then amk56_18 =.;
if amk57_18 =0 then amk57_18 =.;
if amk67_1_1_18 =0 then amk67_1_1_18 =.;
if amk67_1_2_18 =0 then amk67_1_2_18 =.;
if amk67_2_1_18 =0 then amk67_2_1_18 =.;
if amk67_2_2_18 =0 then amk67_2_2_18 =.;
if amk67_3_1_18 =0 then amk67_3_1_18 =.;
if amk67_3_2_18 =0 then amk67_3_2_18 =.;
if amk67_4_1_18 =0 then amk67_4_1_18 =.;
if amk67_4_2_18 =0 then amk67_4_2_18 =.;
if amk83_1_1_18 =0 then amk83_1_1_18 =.;
if amk83_1_2_18 =0 then amk83_1_2_18 =.;
if amk83_2_18 =0 then amk83_2_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk53_18 imamk53_18 amk54_18 imamk54_18 amk56_18 imamk56_18
amk57_18 imamk57_18
amk67_1_1_18 imamk67_1_1_18 amk67_1_2_18 imamk67_1_2_18
amk67_2_1_18 imamk67_2_1_18 amk67_2_2_18 imamk67_2_2_18
amk67_3_1_18 imamk67_3_1_18 amk67_3_2_18 imamk67_3_2_18
amk67_4_1_18 imamk67_4_1_18 amk67_4_2_18 imamk67_4_2_18
amk83_1_1_18 imamk83_1_1_18 amk83_1_2_18 imamk83_1_2_18 amk83_2_18
imamk83_2_18
; run;


************* proxy/pension ***********************;
data out1;
merge output.Group2_proxy_pension1 output.Group2_proxy_pension2
output.group2_proxy_pension3;
by cunicah subhog_18;
rename imamk53_18=amk53_18 imamk54_18=amk54_18 imamk56_18=amk56_18
imamk57_18=amk57_18
imamk67_1_1_18=amk67_1_1_18 imamk67_1_2_18=amk67_1_2_18
imamk67_2_1_18=amk67_2_1_18 imamk67_2_2_18=amk67_2_2_18
imamk67_3_1_18=amk67_3_1_18 imamk67_3_2_18=amk67_3_2_18
imamk67_4_1_18=amk67_4_1_18 imamk67_4_2_18=amk67_4_2_18
```

```
imamk83_1_1_18=amk83_1_1_18 imamk83_1_2_18=amk83_1_2_18
imamk83_2_18=amk83_2_18;run;

data imp1;
merge imp.Group2_proxy_pension1_imputed imp.Group2_proxy_pension2_imputed
imp.Group2_proxy_pension3_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group2 proxy pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk53_18 imamk53_18 amk54_18 imamk54_18 amk56_18 imamk56_18
amk57_18 imamk57_18
amk67_1_1_18 imamk67_1_1_18 amk67_1_2_18 imamk67_1_2_18
amk67_2_1_18 imamk67_2_1_18 amk67_2_2_18 imamk67_2_2_18
amk67_3_1_18 imamk67_3_1_18 amk67_3_2_18 imamk67_3_2_18
amk67_4_1_18 imamk67_4_1_18 amk67_4_2_18 imamk67_4_2_18
amk83_1_1_18 imamk83_1_1_18 amk83_1_2_18 imamk83_1_2_18 amk83_2_18
imamk83_2_18
; run;

Title "Group2 proxy pension - mean without zero";
data out_imp2; set out_imp1;
if imamk53_18 =0 then imamk53_18 =.;
if imamk54_18 =0 then imamk54_18 =.;
if imamk56_18 =0 then imamk56_18 =.;
if imamk57_18 =0 then imamk57_18 =.;
if imamk67_1_1_18 =0 then imamk67_1_1_18 =.;
if imamk67_1_2_18 =0 then imamk67_1_2_18 =.;
if imamk67_2_1_18 =0 then imamk67_2_1_18 =.;
if imamk67_2_2_18 =0 then imamk67_2_2_18 =.;
if imamk67_3_1_18 =0 then imamk67_3_1_18 =.;
if imamk67_3_2_18 =0 then imamk67_3_2_18 =.;
if imamk67_4_1_18 =0 then imamk67_4_1_18 =.;
if imamk67_4_2_18 =0 then imamk67_4_2_18 =.;
if imamk83_1_1_18 =0 then imamk83_1_1_18 =.;
if imamk83_1_2_18 =0 then imamk83_1_2_18 =.;
if imamk83_2_18 =0 then imamk83_2_18 =.;

if amk53_18 =0 then amk53_18 =.;
if amk54_18 =0 then amk54_18 =.;
if amk56_18 =0 then amk56_18 =.;
if amk57_18 =0 then amk57_18 =.;
if amk67_1_1_18 =0 then amk67_1_1_18 =.;
if amk67_1_2_18 =0 then amk67_1_2_18 =.;
if amk67_2_1_18 =0 then amk67_2_1_18 =.;
if amk67_2_2_18 =0 then amk67_2_2_18 =.;
if amk67_3_1_18 =0 then amk67_3_1_18 =.;
if amk67_3_2_18 =0 then amk67_3_2_18 =.;
```

```
if amk67_4_1_18 =0 then amk67_4_1_18 =.;
if amk67_4_2_18 =0 then amk67_4_2_18 =.;
if amk83_1_1_18 =0 then amk83_1_1_18 =.;
if amk83_1_2_18 =0 then amk83_1_2_18 =.;
if amk83_2_18 =0 then amk83_2_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk53_18 imamk53_18 amk54_18 imamk54_18 amk56_18 imamk56_18
amk57_18 imamk57_18
amk67_1_1_18 imamk67_1_1_18 amk67_1_2_18 imamk67_1_2_18
amk67_2_1_18 imamk67_2_1_18 amk67_2_2_18 imamk67_2_2_18
amk67_3_1_18 imamk67_3_1_18 amk67_3_2_18 imamk67_3_2_18
amk67_4_1_18 imamk67_4_1_18 amk67_4_2_18 imamk67_4_2_18
amk83_1_1_18 imamk83_1_1_18 amk83_1_2_18 imamk83_1_2_18 amk83_2_18
imamk83_2_18
; run;
```

GROUP 3. Individual (or Couple)

Total Net Worth and Household

Consumption Components

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group3_core_housing.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 12/15/2020 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** Core questionnaire N=10718;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j25_18 j26_18 j27a_18 j27b_18 J27c_18
j26_18 j28_18 j29a_18 j29b_18 J29c_18
j22_18 j31_18 j32a_18 j32b_18 J32c_18
j33_18 j34_18 j35a_18 j35b_18 J35c_18
j19_18 ;
if tipent_hh_18 in (1); run;
proc freq; table j34_imp_18; run;

data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
imamj26_18=j26_18;**** Imputation N=92;
if j25_18 =1 and missing(j26_18) then imamj26_18=0;
if missing(j25_18) and missing(j26_18) then imamj26_18=0;
if 2<=j25_18<=9 and j26_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999) then imamj26_18=.;
if missing(imamj26_18) and missing(j27a_18) then j27a_18=9;
j26_imp_18=missing(imamj26_18);
imamj28_18=j28_18;**** Imputation N=210;
if j25_18 =1 and missing(j28_18) then imamj28_18=0;
if missing(j25_18) and missing(j28_18) then imamj28_18=0;
if j26_18 <=0 and missing(j28_18) then imamj28_18=0;
if j26_18 >0 and j28_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999,88888888,99999999) then imamj28_18=.;
if missing(imamj28_18) and missing(j29a_18) then j29a_18=9;
j28_imp_18=missing(imamj28_18);
imamj31_18=j31_18;**** Imputation N=3863;
if j19_18 =1 and missing(j31_18) then imamj31_18=0;
if j22_18 in (6,7) and missing(j31_18) then imamj31_18=0;
if j22_18 in (1,2,3,4,5) and j31_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999,9999998,88888888,99999999) then imamj31_18=.;
if missing(imamj31_18) and missing(j32a_18) then j32a_18=9;
```

```
j31_imp_18=missing(imamj31_18);
imamj34_18=j34_18;**** Imputation N=477;
if j33_18 =2 and missing(j34_18) then imamj34_18=0;
if j33_18=1 and j34_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9,9999998,88888888,99999999,99990999,99999998) then imamj34_18=.;
if missing(imamj34_18) and missing(j35a_18) then j35a_18=9;
j34_imp_18=missing(imamj34_18);
run;


***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(j26_18,j27a_18,j27b_18,J27c_18,990000,7500,20000,2000,j27a_18); run;
%range(j28_18,j29a_18,j29b_18,J29c_18,6000000,180000,400000,95000); run;
%range(j31_18,j32a_18,j32b_18,J32c_18,9800000,180000,950000,95000,j22_18);
run;
%range(j34_18,j35a_18,j35b_18,J35c_18,8000000,180000,950000,95000,j33_18);
run;
/*proc means data=aa2; var imamj26_18 imamj28_18 imamj31_18 imamj34_18;
run;*/


data output.group3_core_housing;
merge dataj26_18 dataj28_18 dataj31_18 dataj34_18;
by cunicah subhog_18; run;


data dd1; set output.group3_core_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj26_18
lowj26_18 upj26_18
```

```
j26_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamj26_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj26_18 upj26_18
j26_imp_18
;
bounds
imamj26_18 (>=lowj26_18 ,<=upj26_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj28_18
lowj28_18 upj28_18
j28_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamj28_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj28_18 upj28_18
j28_imp_18
```

```
;
bounds
imamj28_18 (>=lowj28_18 ,<=upj28_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;


data dd1; set output.group3_core_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj31_18 imamj34_18
lowj31_18 upj31_18
lowj34_18 upj34_18
j31_imp_18
j34_imp_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamj31_18 imamj34_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj31_18 upj31_18
lowj34_18 upj34_18
j31_imp_18
j34_imp_18
;
bounds
imamj31_18 (>=lowj31_18 ,<=upj31_18)
imamj34_18 (>=lowj34_18 ,<=upj34_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;


data data imp.group3_core_housing_imputed;
```

```
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop
lowj26_18 upj26_18
lowj28_18 upj28_18
lowj31_18 upj31_18
lowj34_18 upj34_18 ; run;
```

```
/********************************************************/
/* PROGRAM NAME : Imput2018_group3_core_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 1/15/2021 */
/* Impute missing value on core and proxy questionnaire */
/********************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** Core questionnaire N=10718;
data bb1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k17_18
k19_1_18 k20_1_18 k21a1_18 k21b1_18 k21c1_18
k24_1_18 k25a1_18 k25b1_18 k25c1_18
k31a_18 k33_1_18 k34a1_18 k34b1_18 k34c1_18
k31b_18 k33_2_18 k34a2_18 k34b2_18 k34c2_18
k31c_18 k33_3_18 k34a3_18 k34b3_18 k34c3_18
k38_18 k39_18
k40_18 k41a_18 k41b_18 k41c_18
k42_18 k43a_18 k43b_18 k43c_18
k44_18 k45a_18 k45b_18 k45c_18
k85_18 k86_18 k87a_18 k87b_18 k87c_18
k88_18 k89a_18 k89b_18 k89c_18
k1_18
k3_1_18 k4_1_18 k5a1_18 k5b1_18 k5c1_18
k3_2_18 k4_2_18 k5a2_18 k5b2_18 k5c2_18
k8_1_18 k9a1_18 k9b1_18 k9c1_18
k8_2_18 k9a2_18 k9b2_18 k9c2_18 ;
if tipent_hh_18 in (1); run;

******************** 1 ********************;
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk20_1_18=k20_1_18;**** Imputation N=32;
if k17_18=2 and missing(k20_1_18) then imamk20_1_18=0;
if k17_18=1 and k19_1_18 =2 and missing(k20_1_18) then imamk20_1_18=0;
if k17_18=1 and k19_1_18 =1 and k20_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
8,9999999,99999999) then imamk20_1_18=.;
if missing(imamk20_1_18) and missing(k21a1_18) then k21a1_18=9;
imamk24_1_18=k24_1_18;**** Imputation N=244;
if k17_18=2 and missing(k24_1_18) then imamk24_1_18=0;
if k17_18=1 and k24_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
8,9999999,88888888,99999999) then imamk24_1_18=.;
```

```
if missing(imamk24_1_18) and missing(k25a1_18) then k25a1_18=9;
dumk20_1_18=missing(imamk20_1_18);
dumk24_1_18=missing(imamk24_1_18);
run;
/*proc freq; tables age_18 yrschool dumk20_1_18 dumk24_1_18;run;*/

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set bb2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k20_1_18,k21a1_18,k21b1_18,k21c1_18,1500000,180000,500000,95000,k17_1
8,k19_1_18); run;
%range(k24_1_18,k25a1_18,k25b1_18,k25c1_18,9000000,180000,500000,95000,k17_1
8);run;
/*proc means data=bb2; var imamk20_1_18 imamk24_1_18; run;*/

data output.group3_core_pension1;
merge datak20_1_18  datak24_1_18 ;
by cunicah subhog_18;
drop k17_18 k19_1_18 ;
run;

****** 2*****************;
/*proc freq; tables dumk33_3_18;run;*/
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk33_1_18=k33_1_18;**** Imputation N=263;
if k31a_18 =2 and missing(k33_1_18) then imamk33_1_18=0;
if k31a_18=1 and k33_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_1_18=.;
```

```
if missing(imamk33_1_18) and missing(k34a1_18) then k34a1_18=9;
imamk33_2_18=k33_2_18;**** Imputation N=3;
if k31b_18 =2 and missing(k33_2_18) then imamk33_2_18=0;
if k31b_18=1 and k33_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_2_18=.;
if missing(imamk33_2_18) and missing(k34a2_18) then k34a2_18=9;
imamk33_3_18=k33_3_18;**** Imputation N=31;
if k31c_18 =2 and missing(k33_3_18) then imamk33_3_18=0;
if k31c_18=1 and k33_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_3_18=.;
if missing(imamk33_3_18) and missing(k34a3_18) then k34a3_18=9;
dumk33_1_18=missing(imamk33_1_18);
dumk33_2_18=missing(imamk33_2_18);
dumk33_3_18=missing(imamk33_3_18);
run;

%range(k33_1_18,k34a1_18,k34b1_18,k34c1_18,8000000,25000,90000,12000,k31a_18
);run;
%range(k33_2_18,k34a2_18,k34b2_18,k34c2_18,600000,25000,90000,12000,k31b_18)
;run;
%range(k33_3_18,k34a3_18,k34b3_18,k34c3_18,5000000,25000,90000,12000,k31c_18
);run;
/*proc means data=bb2; var imamk33_1_18 imamk33_2_18 imamk33_3_18; run;*/

data output.group3_core_pension2;
merge datak33_1_18 datak33_2_18 datak33_3_18 ;
by cunicah subhog_18;
drop k31a_18 k31b_18 k31c_18;
run;

********** 3 ********************;
/*proc freq; tables k44_imp_18;run;*/
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk40_18=k40_18;**** Imputation N=95;
if k38_18=2 and missing(k40_18) then imamk40_18=0;
if k38_18=1 and k39_18 =2 and missing(k40_18) then imamk40_18=0;
if k38_18=1 and k39_18=1 and k40_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk40_18=.;
if missing(imamk40_18) and missing(k41a_18) then k41a_18=9;
imamk42_18=k42_18;**** Imputation N=565;
if k38_18=2 and missing(k42_18) then imamk42_18=0;
if k38_18=1 and k42_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk42_18=.;
if missing(imamk42_18) and missing(k43a_18) then k43a_18=9;
imamk44_18=k44_18;**** Imputation N=2558;
```

```
if k44_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk44_18=.;
if k44_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then k44b_18=9; *** create a variable for mix
imputed;
if missing(imamk44_18) and missing(k45a_18) then k45a_18=9;
k40_imp_18=missing(imamk40_18);
k42_imp_18=missing(imamk42_18);
k44_imp_18=missing(imamk44_18);
run;

%range(k40_18 ,k41a_18,k41b_18,k41c_18,
500000,180000,500000,95000,k38_18,k39_18);run;
%range(k42_18,k43a_18,k43b_18,k43c_18,6000000,180000,500000,95000,k38_18);
run;
%range(k44_18,k45a_18,k45b_18,k45c_18,9000000,180000,500000,95000,k44b_18);
run;
/*proc means data=bb2; var imamk40_18 imamk42_18 imamk44_18; run;*/

data output.group3_core_pension3;
merge datak40_18 datak42_18 datak44_18 ;
by cunicah subhog_18;
drop k38_18 k39_18 k44b_18; run;

***************** 4 *******************;
/*proc freq; tables k8_1_imp_18;run;*/
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk86_18=k86_18;**** Imputation N=183;
if k85_18 =2 and missing(k86_18) then imamk86_18=0;
if k85_18=1 and k86_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk86_18=.;
if missing(imamk86_18) and missing(k87a_18) then k87a_18=9;
imamk88_18=k88_18;**** Imputation N=886;
if k88_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999989,999998,
8888888,9999998,9999999,9999099) then imamk88_18=.;
if k88_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999989,999998,
8888888,9999998,9999999,9999099) then k88_18b=9; *** create a variable for
mix imputed/no mix imp;
if missing(imamk88_18) and missing(k89a_18) then k89a_18=9;
imamk4_1_18=k4_1_18;**** Imputation N=37;
if k1_18 =2 and missing(k4_1_18) then imamk4_1_18=0;
if k1_18=1 and k3_1_18 =2 and missing(k4_1_18) then imamk4_1_18=0;
if k1_18=1 and k3_1_18=1 and k4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999999) then imamk4_1_18=.;
if missing(imamk4_1_18) and missing(k5a1_18) then k5a1_18=9;
```

```
imamk4_2_18=k4_2_18;**** Imputation N=18;
if k1_18 ne 1 and missing(k4_2_18) then imamk4_2_18=0;
if k3_2_18 =2 and missing(k4_2_18) then imamk4_2_18=0;
if k3_2_18 =. and missing(k4_2_18) then imamk4_2_18=0;
if k1_18 = 1 and k3_2_18 = 1 and k4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk4_2_18=.;
if missing(imamk4_2_18) and missing(k5a2_18) then k5a2_18=9;
imamk8_1_18=k8_1_18;**** Imputation N=670;
if k1_18 =2 and missing(k8_1_18) then imamk8_1_18=0;
if k1_18=1 and k8_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999998,99999999) then imamk8_1_18=.;
if missing(imamk8_1_18) and missing(k9a1_18) then k9a1_18=9;
imamk8_2_18=k8_2_18;**** Imputation N=19;
if k1_18 ne 1 and missing(k8_2_18) then imamk8_2_18=0;
if k1_18 =1 and k8_2_18=. then imamk8_2_18=0;
if k1_18 =1 and k8_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999999) then imamk8_2_18=.;
if missing(imamk8_2_18) and missing(k9a2_18) then k9a2_18=9;
k86_imp_18=missing(imamk86_18);
k88_imp_18=missing(imamk88_18);
k4_1_imp_18=missing(imamk4_1_18);
k4_2_imp_18=missing(imamk4_2_18);
k8_1_imp_18=missing(imamk8_1_18);
k8_2_imp_18=missing(imamk8_2_18);
run;

%range(k86_18,k87a_18,k87b_18,k87c_18, 5000000,25000,90000,12000, k85_18);
run;
%range(k88_18,k89a_18,k89b_18,k89c_18, 5000000, 7500,12000, 4000); run;
%range(k4_1_18,k5a1_18,k5b1_18,k5c1_18,
5000000,150000,500000,50000,k1_18,k3_1_18); run;
%range(k4_2_18,k5a2_18,k5b2_18,k5c2_18,
400000,150000,500000,50000,k3_2_18);run;
%range(k8_1_18,k9a1_18,k9b1_18,k9c1_18, 9000000,150000,500000,50000,k1_18);
run;
%range(k8_2_18,k9a2_18,k9b2_18,k9c2_18, 5000000,150000,500000,50000); run;
/*proc means data=bb2; var imamk86_18 imamk88_18 imamk4_1_18 imamk4_2_18
imamk8_1_18 imamk8_2_18; run;*/

data output.group3_core_pension4;
merge datak86_18 datak88_18 datak4_1_18
datak4_2_18 datak8_1_18 datak8_2_18 ;
by cunicah subhog_18;
drop k85_18 k1_18 k3_1_18 k3_2_18 ; run;

********* 1 ********************;
data dd1;
set output.group3_core_pension1; **** Core nonproxy N=10718 var=10;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
```

```
imamk20_1_18 lowk20_1_18 upk20_1_18 dumk20_1_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk20_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk20_1_18 upk20_1_18
dumk20_1_18
;
bounds
imamk20_1_18 (>=lowk20_1_18 ,<=upk20_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension1; **** Core nonproxy N=10718
var=10;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk24_1_18  lowk24_1_18 upk24_1_18 dumk24_1_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk24_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk24_1_18 upk24_1_18
dumk24_1_18
;
bounds
imamk24_1_18 (>=lowk24_1_18 ,<=upk24_1_18)
```

```
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_core_pension1_imputed;
merge dd_1 dd_2;
by cunicah subhog_18;
drop
lowk20_1_18 upk20_1_18
lowk24_1_18 upk24_1_18
;
run;

************** 2********************;
data dd1; set output.group3_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk33_1_18 lowk33_1_18 upk33_1_18 dumk33_1_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk33_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_1_18 upk33_1_18
dumk33_1_18
;
bounds
imamk33_1_18 (>=lowk33_1_18 ,<=upk33_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk33_2_18 lowk33_2_18 upk33_2_18 dumk33_2_18; run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk33_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_2_18 upk33_2_18
dumk33_2_18
;
bounds
imamk33_2_18 (>=lowk33_2_18 ,<=upk33_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk33_3_18 lowk33_3_18 upk33_3_18 dumk33_3_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk33_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_3_18 upk33_3_18
dumk33_3_18
;
bounds
imamk33_3_18 (>=lowk33_3_18 ,<=upk33_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
```

```
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_core_pension2_imputed;
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop
lowk33_1_18 upk33_1_18
lowk33_2_18 upk33_2_18
lowk33_3_18 upk33_3_18
; run;

*********************** 3 ***********************;
data dd1; set output.group3_core_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk40_18 lowk40_18 upk40_18 k40_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk40_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk40_18 upk40_18
k40_imp_18
;
bounds
imamk40_18 (>=lowk40_18 ,<=upk40_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk42_18 lowk42_18 upk42_18 k42_imp_18
imamk44_18 lowk44_18 upk44_18 k44_imp_18;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk42_18 imamk44_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk42_18 upk42_18
lowk44_18 upk44_18
k42_imp_18
k44_imp_18
;
bounds
imamk42_18 (>=lowk42_18 ,<=upk42_18)
imamk44_18 (>=lowk44_18 ,<=upk44_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_core_pension3_imputed;
merge dd_1 dd_2; by cunicah subhog_18;
drop
lowk40_18 upk40_18
lowk42_18 upk42_18
lowk44_18 upk44_18
; run;

************* 4***********************;
data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk86_18 lowk86_18 upk86_18 k86_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
```

```
count age_18;
mixed imamk86_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk86_18 upk86_18
k86_imp_18
;
bounds
imamk86_18 (>=lowk86_18 ,<=upk86_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk88_18 lowk88_18 upk88_18 k88_imp_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk88_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk88_18 upk88_18
k88_imp_18
;
bounds
imamk88_18 (>=lowk88_18 ,<=upk88_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk4_1_18 lowk4_1_18 upk4_1_18 k4_1_imp_18 ;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk4_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk4_1_18 upk4_1_18
k4_1_imp_18
;
bounds
imamk4_1_18 (>=lowk4_1_18 ,<=upk4_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk4_2_18 lowk4_2_18 upk4_2_18 k4_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_4;
categorical sex_18 ;
count age_18;
mixed imamk4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk4_2_18 upk4_2_18
k4_2_imp_18
;
bounds
imamk4_2_18 (>=lowk4_2_18 ,<=upk4_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
```

```
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk8_1_18 lowk8_1_18 upk8_1_18 k8_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_5;
categorical sex_18 ;
count age_18;
mixed imamk8_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk8_1_18 upk8_1_18
k8_1_imp_18
;
bounds
imamk8_1_18 (>=lowk8_1_18 ,<=upk8_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_core_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk8_2_18 lowk8_2_18 upk8_2_18 k8_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_6;
categorical sex_18 ;
count age_18;
```

```
mixed imamk8_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk8_2_18 upk8_2_18
k8_2_imp_18
;
bounds
imamk8_2_18 (>=lowk8_2_18 ,<=upk8_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group3_core_pension4_imputed; merge dd_1 dd_2 dd_3 dd_4 dd_5
dd_6; by
cunicah subhog_18;
drop
lowk86_18 upk86_18
lowk88_18 upk88_18
lowk4_1_18 upk4_1_18
lowk4_2_18 upk4_2_18
lowk8_1_18 upk8_1_18
lowk8_2_18 upk8_2_18
; run;
```

```
/*****************************************************/
/* PROGRAM NAME : Imput2018_group3_proxy_housing.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 1/15/2021 */
/* Impute missing value on proxy and proxy questionnaire */
/*****************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** proxy questionnaire N=683;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j25_18 j26_18 j27a_18 j27b_18 J27c_18
j26_18 j28_18 j29a_18 j29b_18 J29c_18
j22_18 j31_18 j32a_18 j32b_18 J32c_18
j33_18 j34_18 j35a_18 j35b_18 J35c_18
j19_18 ;
if tipent_hh_18 in (2); run;

/*proc freq; table j26_imp_18 j28_imp_18 j31_imp_18 j34_imp_18; run;*/
data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
imamj26_18=j26_18;**** Imputation N=4;
if j25_18 =1 and missing(j26_18) then imamj26_18=0;
if missing(j25_18) and missing(j26_18) then imamj26_18=0;
if 2<=j25_18<=9 and j26_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamj26_18=.;
if missing(imamj26_18) and missing(j27a_18) then j27a_18=9;
j26_imp_18=missing(imamj26_18);
imamj28_18=j28_18;**** Imputation N=5;
if j25_18 =1 and missing(j28_18) then imamj28_18=0;
if missing(j25_18) and missing(j28_18) then imamj28_18=0;
if j26_18 <=0 and missing(j28_18) then imamj28_18=0;
if j26_18 >0 and j28_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9,88888888,99999999) then imamj28_18=.;
if missing(imamj28_18) and missing(j29a_18) then j29a_18=9;
j28_imp_18=missing(imamj28_18);
imamj31_18=j31_18;**** Imputation N=257;
if j19_18 =1 and missing(j31_18) then imamj31_18=0;
if j22_18 in (6,7) and missing(j31_18) then imamj31_18=0;
if j22_18 in (1,2,3,4,5) and j31_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9,9999998,88888888,99999999) then imamj31_18=.;
if missing(imamj31_18) and missing(j32a_18) then j32a_18=9;
```

```
j31_imp_18=missing(imamj31_18);
imamj34_18=j34_18;**** Imputation N=26;
if j33_18 =2 and missing(j34_18) then imamj34_18=0;
if j33_18=1 and j34_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9,9999998,88888888,99999999,99990999,99999998) then imamj34_18=.;
if missing(imamj34_18) and missing(j35a_18) then j35a_18=9;
j34_imp_18=missing(imamj34_18);
run;


***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(j26_18,j27a_18,j27b_18,J27c_18,990000,7500,20000,2000,j27a_18); run;
%range(j28_18,j29a_18,j29b_18,J29c_18,6000000,180000,400000,95000); run;
%range(j31_18,j32a_18,j32b_18,J32c_18,9800000,180000,950000,95000,j22_18);
run;
%range(j34_18,j35a_18,j35b_18,J35c_18,8000000,180000,950000,95000,j33_18);
run;
/*proc means data=aa2; var imamj26_18 imamj28_18 imamj31_18 imamj34_18;
run;*/

data output.group3_proxy_housing;
merge dataj26_18 dataj28_18 dataj31_18 dataj34_18;
by cunicah subhog_18; run;

data dd1; set output.group3_proxy_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj26_18
lowj26_18 upj26_18
```

```
j26_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamj26_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj26_18 upj26_18
j26_imp_18
;
bounds
imamj26_18 (>=lowj26_18 ,<=upj26_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj28_18
lowj28_18 upj28_18
j28_imp_18
;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamj28_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj28_18 upj28_18
j28_imp_18
```

```
;
bounds
imamj28_18 (>=lowj28_18 ,<=upj28_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_housing;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamj31_18 imamj34_18
lowj31_18 upj31_18
lowj34_18 upj34_18
j31_imp_18
j34_imp_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamj31_18 imamj34_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj31_18 upj31_18
lowj34_18 upj34_18
j31_imp_18
j34_imp_18
;
bounds
imamj31_18 (>=lowj31_18 ,<=upj31_18)
imamj34_18 (>=lowj34_18 ,<=upj34_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 1;
/*multiples 5;*/
seed 2018;
run;

data data imp.group3_proxy_housing_imputed;
merge dd_1 dd_2 dd_3;
```

```
by cunicah subhog_18;
drop
lowj26_18 upj26_18
lowj28_18 upj28_18
lowj31_18 upj31_18
lowj34_18 upj34_18 ; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group3_proxy_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 1/15/2021 */
/* Impute missing value on proxy and proxy questionnaire */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** proxy questionnaire N=683;
data bb1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k17_18
k19_1_18 k20_1_18 k21a1_18 k21b1_18 k21c1_18
k24_1_18 k25a1_18 k25b1_18 k25c1_18
k31a_18 k33_1_18 k34a1_18 k34b1_18 k34c1_18
k31b_18 k33_2_18 k34a2_18 k34b2_18 k34c2_18
k31c_18 k33_3_18 k34a3_18 k34b3_18 k34c3_18
k38_18 k39_18
k40_18 k41a_18 k41b_18 k41c_18
k42_18 k43a_18 k43b_18 k43c_18
k44_18 k45a_18 k45b_18 k45c_18
k85_18 k86_18 k87a_18 k87b_18 k87c_18
k88_18 k89a_18 k89b_18 k89c_18
k1_18
k3_1_18 k4_1_18 k5a1_18 k5b1_18 k5c1_18
k3_2_18 k4_2_18 k5a2_18 k5b2_18 k5c2_18
k8_1_18 k9a1_18 k9b1_18 k9c1_18
k8_2_18 k9a2_18 k9b2_18 k9c2_18 ;
if tipent_hh_18 in (2); run;

******************** 1 ********************;
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk20_1_18=k20_1_18;**** Imputation N=3;
if k17_18=2 and missing(k20_1_18) then imamk20_1_18=0;
if k17_18=1 and k19_1_18 =2 and missing(k20_1_18) then imamk20_1_18=0;
if k17_18=1 and k19_1_18 =1 and k20_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999998,9999999,99999999) then imamk20_1_18=.;
if missing(imamk20_1_18) and missing(k21a1_18) then k21a1_18=9;
imamk24_1_18=k24_1_18;**** Imputation N=17;
if k17_18=2 and missing(k24_1_18) then imamk24_1_18=0;
if k17_18=1 and k24_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999998,9999999,88888888,99999999) then imamk24_1_18=.;
```

```
if missing(imamk24_1_18) and missing(k25a1_18) then k25a1_18=9;
dumk20_1_18=missing(imamk20_1_18);
dumk24_1_18=missing(imamk24_1_18);
run;
/*proc freq; tables age_18 yrschool dumk20_1_18 dumk24_1_18;run;*/

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set bb2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k20_1_18,k21a1_18,k21b1_18,k21c1_18,1500000,180000,500000,95000,k17_1
8,k19_1_18); run;
%range(k24_1_18,k25a1_18,k25b1_18,k25c1_18,9000000,180000,500000,95000,k17_1
8);run;
/*proc means data=bb2; var imamk20_1_18 imamk24_1_18; run;*/

data output.group3_proxy_pension1;
merge datak20_1_18  datak24_1_18 ;
by cunicah subhog_18;
drop k17_18 k19_1_18 ;
run;

****** 2*****************;
/*proc freq; tables dumk33_1_18 dumk33_2_18 dumk33_3_18;run;*/
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk33_1_18=k33_1_18;**** Imputation N=22;
if k31a_18 =2 and missing(k33_1_18) then imamk33_1_18=0;
if k31a_18=1 and k33_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_1_18=.;
```

```
if missing(imamk33_1_18) and missing(k34a1_18) then k34a1_18=9;
imamk33_2_18=k33_2_18;**** Imputation N=2;
if k31b_18 =2 and missing(k33_2_18) then imamk33_2_18=0;
if k31b_18=1 and k33_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_2_18=.;
if missing(imamk33_2_18) and missing(k34a2_18) then k34a2_18=9;
imamk33_3_18=k33_3_18;**** Imputation N=4;
if k31c_18 =2 and missing(k33_3_18) then imamk33_3_18=0;
if k31c_18=1 and k33_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
8,9999999,88888888,99999999)then imamk33_3_18=.;
if missing(imamk33_3_18) and missing(k34a3_18) then k34a3_18=9;
dumk33_1_18=missing(imamk33_1_18);
dumk33_2_18=missing(imamk33_2_18);
dumk33_3_18=missing(imamk33_3_18);
run;

%range(k33_1_18,k34a1_18,k34b1_18,k34c1_18,8000000,25000,90000,12000,k31a_18
);run;
%range(k33_2_18,k34a2_18,k34b2_18,k34c2_18,600000,25000,90000,12000,k31b_18)
;run;
%range(k33_3_18,k34a3_18,k34b3_18,k34c3_18,5000000,25000,90000,12000,k31c_18
);run;
/*proc means data=bb2; var imamk33_1_18 imamk33_2_18 imamk33_3_18; run;*/

data output.group3_proxy_pension2;
merge datak33_1_18 datak33_2_18 datak33_3_18 ;
by cunicah subhog_18;
drop k31a_18 k31b_18 k31c_18;
run;

********** 3 *******************;
/*proc freq; tables k40_imp_18 k42_imp_18 k44_imp_18;run;*/
data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk40_18=k40_18;**** Imputation N=6;
if k38_18=2 and missing(k40_18) then imamk40_18=0;
if k38_18=1 and k39_18 =2 and missing(k40_18) then imamk40_18=0;
if k38_18=1 and k39_18=1 and k40_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk40_18=.;
if missing(imamk40_18) and missing(k41a_18) then k41a_18=9;
imamk42_18=k42_18;**** Imputation N=19;
if k38_18=2 and missing(k42_18) then imamk42_18=0;
if k38_18=1 and k42_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk42_18=.;
if missing(imamk42_18) and missing(k43a_18) then k43a_18=9;
imamk44_18=k44_18;**** Imputation N=178;
```

```
if k44_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk44_18=.;
if k44_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then k44b_18=9; *** create a variable for mix
imputed;
if missing(imamk44_18) and missing(k45a_18) then k45a_18=9;
k40_imp_18=missing(imamk40_18);
k42_imp_18=missing(imamk42_18);
k44_imp_18=missing(imamk44_18);
run;

%range(k40_18 ,k41a_18,k41b_18,k41c_18,
500000,180000,500000,95000,k38_18,k39_18);run;
%range(k42_18,k43a_18,k43b_18,k43c_18,6000000,180000,500000,95000,k38_18);
run;
%range(k44_18,k45a_18,k45b_18,k45c_18,9000000,180000,500000,95000,k44b_18);
run;
/*proc means data=bb2; var imamk40_18 imamk42_18 imamk44_18; run;*/

data output.group3_proxy_pension3;
merge datak40_18 datak42_18 datak44_18 ;
by cunicah subhog_18;
drop k38_18 k39_18 k44b_18; run;

***************** 4 ******************;

data bb2; set bb1;
if age_18 in (888, 999) then age_18=.;
imamk86_18=k86_18;**** Imputation N=17;
if k85_18 =2 and missing(k86_18) then imamk86_18=0;
if k85_18=1 and k86_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk86_18=.;
if missing(imamk86_18) and missing(k87a_18) then k87a_18=9;
imamk88_18=k88_18;**** Imputation N=91;
if k88_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999989,999998,
8888888,9999998,9999999,9999099) then imamk88_18=.;
if k88_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999989,999998,
8888888,9999998,9999999,9999099) then k88_18b=9; *** create a variable for
mix imputed/no mix imp;
if missing(imamk88_18) and missing(k89a_18) then k89a_18=9;
imamk4_1_18=k4_1_18;**** Imputation N=2;
if k1_18 =2 and missing(k4_1_18) then imamk4_1_18=0;
if k1_18=1 and k3_1_18 =2 and missing(k4_1_18) then imamk4_1_18=0;
if k1_18=1 and k3_1_18=1 and k4_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999999) then imamk4_1_18=.;
if missing(imamk4_1_18) and missing(k5a1_18) then k5a1_18=9;
```

```
imamk4_2_18=k4_2_18;**** Imputation N=3;
if k1_18 ne 1 and missing(k4_2_18) then imamk4_2_18=0;
if k3_2_18 =2 and missing(k4_2_18) then imamk4_2_18=0;
if k3_2_18 =. and missing(k4_2_18) then imamk4_2_18=0;
if k1_18 = 1 and k3_2_18 = 1 and k4_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099) then imamk4_2_18=.;
if missing(imamk4_2_18) and missing(k5a2_18) then k5a2_18=9;
imamk8_1_18=k8_1_18;**** Imputation N=32;
if k1_18 =2 and missing(k8_1_18) then imamk8_1_18=0;
if k1_18=1 and k8_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999998,99999999) then imamk8_1_18=.;
if missing(imamk8_1_18) and missing(k9a1_18) then k9a1_18=9;
imamk8_2_18=k8_2_18;**** Imputation N=3;
if k1_18 ne 1 and missing(k8_2_18) then imamk8_2_18=0;
if k1_18 =1 and k8_2_18=. then imamk8_2_18=0;
if k1_18 =1 and k8_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,8888888
,9999998,9999999,9999099,88888888,99999999) then imamk8_2_18=.;
if missing(imamk8_2_18) and missing(k9a2_18) then k9a2_18=9;
k86_imp_18=missing(imamk86_18);
k88_imp_18=missing(imamk88_18);
k4_1_imp_18=missing(imamk4_1_18);
k4_2_imp_18=missing(imamk4_2_18);
k8_1_imp_18=missing(imamk8_1_18);
k8_2_imp_18=missing(imamk8_2_18);
run;
/*proc freq; tables k86_imp_18 k88_imp_18 k4_1_imp_18 k4_2_imp_18
k8_1_imp_18 k8_2_imp_18;run;*/

%range(k86_18,k87a_18,k87b_18,k87c_18, 5000000,25000,90000,12000, k85_18);
run;
%range(k88_18,k89a_18,k89b_18,k89c_18, 5000000, 7500,12000, 4000); run;
%range(k4_1_18,k5a1_18,k5b1_18,k5c1_18,
5000000,150000,500000,50000,k1_18,k3_1_18); run;
%range(k4_2_18,k5a2_18,k5b2_18,k5c2_18,
400000,150000,500000,50000,k3_2_18);run;
%range(k8_1_18,k9a1_18,k9b1_18,k9c1_18, 9000000,150000,500000,50000,k1_18);
run;
%range(k8_2_18,k9a2_18,k9b2_18,k9c2_18, 5000000,150000,500000,50000); run;
/*proc means data=bb2; var imamk86_18 imamk88_18 imamk4_1_18 imamk4_2_18
imamk8_1_18 imamk8_2_18; run;*/

data output.group3_proxy_pension4;
merge datak86_18 datak88_18 datak4_1_18
datak4_2_18 datak8_1_18 datak8_2_18 ;
by cunicah subhog_18;
drop k85_18 k1_18 k3_1_18 k3_2_18 ; run;

********* 1 *******************;
data dd1;
```

```
set output.group3_proxy_pension1; **** proxy N=683 var=10;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk20_1_18 lowk20_1_18 upk20_1_18 dumk20_1_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk20_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk20_1_18 upk20_1_18
dumk20_1_18
;
bounds
imamk20_1_18 (>=lowk20_1_18 ,<=upk20_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension1; **** proxy N=683 var=10;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk24_1_18  lowk24_1_18 upk24_1_18 dumk24_1_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk24_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk24_1_18 upk24_1_18
dumk24_1_18
;
bounds
```

```
imamk24_1_18 (>=lowk24_1_18 ,<=upk24_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_proxy_pension1_imputed;
merge dd_1 dd_2;
by cunicah subhog_18;
drop
lowk20_1_18 upk20_1_18
lowk24_1_18 upk24_1_18
;
run;

*************** 2********************;
data dd1; set output.group3_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk33_1_18 lowk33_1_18 upk33_1_18 dumk33_1_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk33_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_1_18 upk33_1_18
dumk33_1_18
;
bounds
imamk33_1_18 (>=lowk33_1_18 ,<=upk33_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
```

```
imamk33_2_18 lowk33_2_18 upk33_2_18 dumk33_2_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk33_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_2_18 upk33_2_18
dumk33_2_18
;
bounds
imamk33_2_18 (>=lowk33_2_18 ,<=upk33_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension2;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk33_3_18 lowk33_3_18 upk33_3_18 dumk33_3_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk33_3_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk33_3_18 upk33_3_18
dumk33_3_18
;
bounds
imamk33_3_18 (>=lowk33_3_18 ,<=upk33_3_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
```

```
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_proxy_pension2_imputed;
merge dd_1 dd_2 dd_3;
by cunicah subhog_18;
drop
lowk33_1_18 upk33_1_18
lowk33_2_18 upk33_2_18
lowk33_3_18 upk33_3_18
; run;

*********************** 3 ***********************;
data dd1; set output.group3_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk40_18 lowk40_18 upk40_18 k40_imp_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
count age_18;
mixed imamk40_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk40_18 upk40_18
k40_imp_18
;
bounds
imamk40_18 (>=lowk40_18 ,<=upk40_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension3;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk42_18 lowk42_18 upk42_18 k42_imp_18
imamk44_18 lowk44_18 upk44_18 k44_imp_18;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk42_18 imamk44_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk42_18 upk42_18
lowk44_18 upk44_18
k42_imp_18
k44_imp_18
;
bounds
imamk42_18 (>=lowk42_18 ,<=upk42_18)
imamk44_18 (>=lowk44_18 ,<=upk44_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group3_proxy_pension3_imputed;
merge dd_1 dd_2; by cunicah subhog_18;
drop
lowk40_18 upk40_18
lowk42_18 upk42_18
lowk44_18 upk44_18
; run;

************* 4***********************;
data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk86_18 lowk86_18 upk86_18 k86_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18 ;
```

```
count age_18;
mixed imamk86_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk86_18 upk86_18
k86_imp_18
;
bounds
imamk86_18 (>=lowk86_18 ,<=upk86_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk88_18 lowk88_18 upk88_18 k88_imp_18;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18 ;
count age_18;
mixed imamk88_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk88_18 upk88_18
k88_imp_18
;
bounds
imamk88_18 (>=lowk88_18 ,<=upk88_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk4_1_18 lowk4_1_18 upk4_1_18 k4_1_imp_18 ;
run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_3;
categorical sex_18 ;
count age_18;
mixed imamk4_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk4_1_18 upk4_1_18
k4_1_imp_18
;
bounds
imamk4_1_18 (>=lowk4_1_18 ,<=upk4_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk4_2_18 lowk4_2_18 upk4_2_18 k4_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_4;
categorical sex_18 ;
count age_18;
mixed imamk4_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk4_2_18 upk4_2_18
k4_2_imp_18
;
bounds
imamk4_2_18 (>=lowk4_2_18 ,<=upk4_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
```

```
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk8_1_18 lowk8_1_18 upk8_1_18 k8_1_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_5;
categorical sex_18 ;
count age_18;
mixed imamk8_1_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk8_1_18 upk8_1_18
k8_1_imp_18
;
bounds
imamk8_1_18 (>=lowk8_1_18 ,<=upk8_1_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data dd1; set output.group3_proxy_pension4;
keep cunicah subhog_18 tipent_hh_18 sex_18 age_18 yrschool
imamk8_2_18 lowk8_2_18 upk8_2_18 k8_2_imp_18 ;
run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_6;
categorical sex_18 ;
count age_18;
```

```
mixed imamk8_2_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk8_2_18 upk8_2_18
k8_2_imp_18
;
bounds
imamk8_2_18 (>=lowk8_2_18 ,<=upk8_2_18)
yrschool(<=22, >=0)
age_18(<=102, >=18)
;
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data data imp.group3_proxy_pension4_imputed; merge dd_1 dd_2 dd_3 dd_4 dd_5
dd_6; by
cunicah subhog_18;
drop
lowk86_18 upk86_18
lowk88_18 upk88_18
lowk4_1_18 upk4_1_18
lowk4_2_18 upk4_2_18
lowk8_1_18 upk8_1_18
lowk8_2_18 upk8_2_18
; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group3_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 1/22/2021 */
/*
*/
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

*************** core/housing ************************;
data out1;
merge output.Group3_core_housing;
by cunicah subhog_18;
rename imamj26_18=amj26_18 imamj28_18=amj28_18 imamj31_18=amj31_18
imamj34_18=amj34_18;run;

data imp1;
merge imp.Group3_core_housing_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group3 core housing - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amj26_18 imamj26_18 amj28_18 imamj28_18 amj31_18 imamj31_18
amj34_18 imamj34_18;
; run;

Title "Group3 core housing - mean without zero";
data out_imp2; set out_imp1;
if imamj26_18 =0 then imamj26_18 =.;
if imamj28_18 =0 then imamj28_18 =.;
if imamj31_18 =0 then imamj31_18 =.;
if imamj34_18 =0 then imamj34_18 =.;

if amj26_18 =0 then amj26_18 =.;
if amj28_18 =0 then amj28_18 =.;
if amj31_18 =0 then amj31_18 =.;
if amj34_18 =0 then amj34_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amj26_18 imamj26_18 amj28_18 imamj28_18 amj31_18 imamj31_18
amj34_18 imamj34_18
; run;

****************** core /pension ****************;
data out1; merge output.group3_core_pension1 output.group3_core_pension2
```

```
output.group3_core_pension3 output.group3_core_pension4;
by cunicah subhog_18;
rename imamk20_1_18=amk20_1_18 imamk24_1_18=amk24_1_18
imamk33_1_18=amk33_1_18 imamk33_2_18=amk33_2_18 imamk33_3_18=amk33_3_18
imamk40_18=amk40_18 imamk42_18=amk42_18 imamk44_18=amk44_18
imamk86_18=amk86_18 imamk88_18=amk88_18 imamk4_1_18=amk4_1_18
imamk4_2_18=amk4_2_18 imamk8_1_18=amk8_1_18 imamk8_2_18=amk8_2_18
;
run;

data imp1;
merge imp.group3_core_pension1_imputed imp.group3_core_pension2_imputed
imp.group3_core_pension3_imputed
imp.group3_core_pension4_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group3 core pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk20_1_18 imamk20_1_18 amk24_1_18 imamk24_1_18
amk33_1_18 imamk33_1_18 amk33_2_18 imamk33_2_18 amk33_3_18 imamk33_3_18
amk40_18 imamk40_18 amk42_18 imamk42_18 amk44_18 imamk44_18
amk86_18 imamk86_18 amk88_18 imamk88_18 amk4_1_18 imamk4_1_18 amk4_2_18
imamk4_2_18 amk8_1_18 imamk8_1_18 amk8_2_18 imamk8_2_18
; run;

Title "Group3 core pension - mean without zero";
data out_imp2; set out_imp1;
if imamk20_1_18 =0 then imamk20_1_18 =.;
if imamk24_1_18 =0 then imamk24_1_18 =.;
if imamk33_1_18 =0 then imamk33_1_18 =.;
if imamk33_2_18 =0 then imamk33_2_18 =.;
if imamk33_3_18 =0 then imamk33_3_18 =.;
if imamk40_18 =0 then imamk40_18 =.;
if imamk42_18 =0 then imamk42_18 =.;
if imamk44_18 =0 then imamk44_18 =.;
if imamk86_18 =0 then imamk86_18 =.;
if imamk88_18 =0 then imamk88_18 =.;
if imamk4_1_18 =0 then imamk4_1_18 =.;
if imamk4_2_18 =0 then imamk4_2_18 =.;
if imamk8_1_18 =0 then imamk8_1_18 =.;
if imamk8_2_18 =0 then imamk8_2_18 =.;

if amk20_1_18 =0 then amk20_1_18 =.;
if amk24_1_18 =0 then amk24_1_18 =.;
if amk33_1_18 =0 then amk33_1_18 =.;
if amk33_2_18 =0 then amk33_2_18 =.;
if amk33_3_18 =0 then amk33_3_18 =.;
if amk40_18 =0 then amk40_18 =.;
```

```
if amk42_18 =0 then amk42_18 =.;
if amk44_18 =0 then amk44_18 =.;
if amk86_18 =0 then amk86_18 =.;
if amk88_18 =0 then amk88_18 =.;
if amk4_1_18 =0 then amk4_1_18 =.;
if amk4_2_18 =0 then amk4_2_18 =.;
if amk8_1_18 =0 then amk8_1_18 =.;
if amk8_2_18 =0 then amk8_2_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk20_1_18 imamk20_1_18 amk24_1_18 imamk24_1_18
amk33_1_18 imamk33_1_18 amk33_2_18 imamk33_2_18 amk33_3_18 imamk33_3_18
amk40_18 imamk40_18 amk42_18 imamk42_18 amk44_18 imamk44_18
amk86_18 imamk86_18 amk88_18 imamk88_18 amk4_1_18 imamk4_1_18 amk4_2_18
imamk4_2_18 amk8_1_18 imamk8_1_18 amk8_2_18 imamk8_2_18
; run;


***************** proxy/ Housing ****************************;
data out1;
merge output.Group3_proxy_housing;
by cunicah subhog_18;
rename imamj26_18=amj26_18 imamj28_18=amj28_18 imamj31_18=amj31_18
imamj34_18=amj34_18;run;

data imp1;
merge imp.Group3_proxy_housing_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group3 proxy housing - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amj26_18 imamj26_18 amj28_18 imamj28_18 amj31_18 imamj31_18
amj34_18 imamj34_18;
; run;

Title "Group3 proxy housing - mean without zero";
data out_imp2; set out_imp1;
if imamj26_18 =0 then imamj26_18 =.;
if imamj28_18 =0 then imamj28_18 =.;
if imamj31_18 =0 then imamj31_18 =.;
if imamj34_18 =0 then imamj34_18 =.;

if amj26_18 =0 then amj26_18 =.;
if amj28_18 =0 then amj28_18 =.;
if amj31_18 =0 then amj31_18 =.;
if amj34_18 =0 then amj34_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
```

```
variable amj26_18 imamj26_18 amj28_18 imamj28_18 amj31_18 imamj31_18
amj34_18 imamj34_18
; run;


****************** proxy /pension ******************;
data out1; merge output.group3_proxy_pension1 output.group3_proxy_pension2
output.group3_proxy_pension3 output.group3_proxy_pension4;
by cunicah subhog_18;
rename imamk20_1_18=amk20_1_18 imamk24_1_18=amk24_1_18
imamk33_1_18=amk33_1_18 imamk33_2_18=amk33_2_18 imamk33_3_18=amk33_3_18
imamk40_18=amk40_18 imamk42_18=amk42_18 imamk44_18=amk44_18
imamk86_18=amk86_18 imamk88_18=amk88_18 imamk4_1_18=amk4_1_18
imamk4_2_18=amk4_2_18 imamk8_1_18=amk8_1_18 imamk8_2_18=amk8_2_18
;
run;

data imp1;
merge imp.group3_proxy_pension1_imputed imp.group3_proxy_pension2_imputed
imp.group3_proxy_pension3_imputed
imp.group3_proxy_pension4_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18; run;

*** print putput;
Title "Group3 proxy pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk20_1_18 imamk20_1_18 amk24_1_18 imamk24_1_18
amk33_1_18 imamk33_1_18 amk33_2_18 imamk33_2_18 amk33_3_18 imamk33_3_18
amk40_18 imamk40_18 amk42_18 imamk42_18 amk44_18 imamk44_18
amk86_18 imamk86_18 amk88_18 imamk88_18 amk4_1_18 imamk4_1_18 amk4_2_18
imamk4_2_18 amk8_1_18 imamk8_1_18 amk8_2_18 imamk8_2_18
; run;

Title "Group3 proxy pension - mean without zero";
data out_imp2; set out_imp1;
if imamk20_1_18 =0 then imamk20_1_18 =.;
if imamk24_1_18 =0 then imamk24_1_18 =.;
if imamk33_1_18 =0 then imamk33_1_18 =.;
if imamk33_2_18 =0 then imamk33_2_18 =.;
if imamk33_3_18 =0 then imamk33_3_18 =.;
if imamk40_18 =0 then imamk40_18 =.;
if imamk42_18 =0 then imamk42_18 =.;
if imamk44_18 =0 then imamk44_18 =.;
if imamk86_18 =0 then imamk86_18 =.;
if imamk88_18 =0 then imamk88_18 =.;
if imamk4_1_18 =0 then imamk4_1_18 =.;
if imamk4_2_18 =0 then imamk4_2_18 =.;
if imamk8_1_18 =0 then imamk8_1_18 =.;
if imamk8_2_18 =0 then imamk8_2_18 =.;
```

```
if amk20_1_18 =0 then amk20_1_18 =.;
if amk24_1_18 =0 then amk24_1_18 =.;
if amk33_1_18 =0 then amk33_1_18 =.;
if amk33_2_18 =0 then amk33_2_18 =.;
if amk33_3_18 =0 then amk33_3_18 =.;
if amk40_18 =0 then amk40_18 =.;
if amk42_18 =0 then amk42_18 =.;
if amk44_18 =0 then amk44_18 =.;
if amk86_18 =0 then amk86_18 =.;
if amk88_18 =0 then amk88_18 =.;
if amk4_1_18 =0 then amk4_1_18 =.;
if amk4_2_18 =0 then amk4_2_18 =.;
if amk8_1_18 =0 then amk8_1_18 =.;
if amk8_2_18 =0 then amk8_2_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk20_1_18 imamk20_1_18 amk24_1_18 imamk24_1_18
amk33_1_18 imamk33_1_18 amk33_2_18 imamk33_2_18 amk33_3_18 imamk33_3_18
amk40_18 imamk40_18 amk42_18 imamk42_18 amk44_18 imamk44_18
amk86_18 imamk86_18 amk88_18 imamk88_18 amk4_1_18 imamk4_1_18 amk4_2_18
imamk4_2_18 amk8_1_18 imamk8_1_18 amk8_2_18 imamk8_2_18
; run;
```

GROUP 4. Hospitalizations and other utilization of health care services

```
/*****************************************************/
/* PROGRAM NAME : impute2018_group4_core.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 3/2/2021 */
/* impute missing value on core and proxy questionnaire */
/*****************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set input.Sect_a_c_d_f_e_pc_h_i_2018; ***core and proxy
questionnaire n=17,114 var=955;
proc sort out=temp nodupkey; by cunicah np; run; ***no duplicate;
proc freq ;table tipent_18; run;
/*proc contents data=aa;
run;
proc means data=aa;
var age_18;
run;*/
**** Core N=15,786;
data aa1; set aa;
keep cunicah np age_18 sex_18 yrschool tipent_18 subhog_18
d4_18
d6_18 d7a_18 d7b_18 d7c_18
d8_1_18 d9_1_18 d10a1_18 d10b1_18 d10c1_18
d8_2_18 d9_2_18 d10a2_18 d10b2_18 d10c2_18
d8_3_18 d9_3_18 d10a3_18 d10b3_18 d10c3_18
d11_18 d12a_18 d12b_a_18 d12b_b_18 d12b_c_18;
if tipent_18 in (1,2); *1,2=direct;
run;
proc sort; by cunicah np; run;
/*
proc freq data=aa1;
tables sex_18 age_18 yrschool;
run;

proc freq data=aa2;
tables imamd12a_18;
run;

data tmp;
set aa2;
if d9_1_18m ^=9 and missing(imamd9_1_18);
run;
*/
***** define missing value;
data aa2; set aa1;
if age_18 in (888,999) then age_18=.; **** missing N=19;
if yrschool in (88,99) then yrschool=.; **** missing N=142;
amd_school=yrschool;
amd_age=age_18;
```

```
imamd6_18=d6_18; *total expense for hosp;**** N=159;
if d4_18=0 and missing(d6_18) then imamd6_18=0; *d4_18: #nights in hosp;
if d4_18 in(888,999) then d4_18m=9; **** create mix output variable; *=9
then 0 is possible;
if d4_18 >0 and d4_18 <888 and d6_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888) then imamd6_18=.;
if missing(imamd6_18) and missing(d7a_18) then d7a_18=9; *d7a_18:more than
$7500? 9=DK;
imamd9_1_18=d9_1_18; *total expense for dentist visit;**** N=194;
if d8_1_18=0 and missing(d9_1_18) then imamd9_1_18=0;
if d8_1_18>0 and d9_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_1_18=.;
if missing(imamd9_1_18) & d9_1_18 not in (777777) & (missing(d10a1_18) or
d10a1_18=9) & (missing(d10b1_18) or d10b1_18=9) & (missing(d10c1_18) or
d10c1_18=9) then d9_1_18m=9; *** create a mix output variable;
if missing(imamd9_1_18) and missing(d10a1_18) then d10a1_18=9; *d10a1_18:
more than $2000? 9=DK;
imamd9_2_18=d9_2_18; *total expense for outpatient service;**** N=66;
if d8_2_18=0 and missing(d9_2_18) then imamd9_2_18=0;
if d8_2_18>0 and d9_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_2_18=.;
if missing(imamd9_2_18) & d9_2_18 not in (777777) & (missing(d10a2_18) or
d10a2_18=9) & (missing(d10b2_18) or d10b2_18=9) & (missing(d10c2_18) or
d10c2_18=9) then d9_2_18m=9;;
if missing(imamd9_2_18) and missing(d10a2_18) then d10a2_18=9;
imamd9_3_18=d9_3_18; *total expense for medical visit;**** N=268;
if d8_3_18=0 and missing(d9_3_18) then imamd9_3_18=0;
if d8_3_18>0 and d9_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_3_18=.;
if missing(imamd9_3_18) & d9_3_18 not in (777777) & (missing(d10a3_18) or
d10a3_18=9) & (missing(d10b3_18) or d10b3_18=9) & (missing(d10c3_18) or
d10c3_18=9) then d9_3_18m=9;
if missing(imamd9_3_18) and missing(d10a3_18) then d10a3_18=9;
imamd12a_18=d12a_18;*monthly expense for medications;**** N=407;
if d12a_18 in (9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,
777777) then imamd12a_18=.;
if missing(imamd12a_18) & d12a_18 not in (777777) & (missing(d12b_a_18) or
d12b_a_18=9) & (missing(d12b_b_18) or d12b_b_18=9) & (missing(d12b_c_18) or
d12b_c_18=9) then d12a_18m=9;
if missing(imamd12a_18) and missing(d12b_a_18) then d12b_a_18=9;
d6_imp_18=1*(missing(imamd6_18));
d9_1_imp_18=1*(missing(imamd9_1_18));
d9_2_imp_18=1*(missing(imamd9_2_18));
d9_3_imp_18=1*(missing(imamd9_3_18));
d12a_imp_18=1*(missing(imamd12a_18));
run;

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
```

```
data data&vname
(keep=cunicah np subhog_18 tipent_18 yrschool sex_18 age_18 imam&vname
dum&vname
low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &va=1 and &vc=1 then do; low&vname=&r1_2; up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2; end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax; end;
if &va=2 and &vb=1 then do; low&vname=&r2_1; up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1; end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1; end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(d6_18,d7a_18,d7b_18,d7c_18,350000,7500,30000,4000,d4_18m); run;
%range(d9_1_18,d10a1_18,d10b1_18,d10c1_18, 600000,2000,15000,400,d9_1_18m);
run;
%range(d9_2_18,d10a2_18,d10b2_18,d10c2_18,200000,2000,15000,400,d9_2_18m);
run;
%range(d9_3_18,d10a3_18,d10b3_18,d10c3_18,200000,2000,15000,400,d9_3_18m);
run;
%range(d12a_18,d12b_a_18,d12b_b_18,d12b_c_18,800000,400,2000,200,d12a_18m);
run;
/*proc means data=aa2; var imamd6_18 imamd9_1_18 imamd9_2_18 imamd9_3_18
imamd12a_18; run;*/

data output.group4_core_health; merge datad6_18 datad9_1_18 datad9_2_18
datad9_3_18 datad12a_18;
by cunicah np;
drop d4_18m d9_1_18m d9_2_18m d9_3_18m d12a_18m;
label
imamd6_18="total hospital expense"
imamd9_1_18="total expense for dentist visit(s)"
imamd9_2_18="total expense for outpatient procedures"
imamd9_3_18="total expense for medical visits"
imamd12a_18="monthly medication expense";
run;

data dd1; set output.group4_core_health; run;
/*
proc freq data=dd1;
tables age_18;
run;
*/
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
```

```
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamd6_18 imamd9_1_18 imamd9_2_18 imamd9_3_18 imamd12a_18 yrschool;
transfer cunicah np tipent_18
lowd6_18 upd6_18 lowd9_1_18 upd9_1_18 lowd9_2_18 upd9_2_18 lowd9_3_18
upd9_3_18 lowd12a_18 upd12a_18
d6_imp_18
d9_1_imp_18
d9_2_imp_18
d9_3_imp_18
d12a_imp_18 ;
bounds imamd6_18(<=upd6_18,>=lowd6_18)
imamd9_1_18(<=upd9_1_18,>=lowd9_1_18)
imamd9_2_18(<=upd9_2_18,>=lowd9_2_18)
imamd9_3_18(<=upd9_3_18,>=lowd9_3_18)
imamd12a_18(<=upd12a_18,>=lowd12a_18)
yrschool(<=22, >=0)
age_18(<=102, >=16);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;

/* proc freq; table imamd6_18; where d6_imp_18=1; run; *** n=159 imputed;
proc freq; table imamd9_1_18; where d9_1_imp_18=1; run; *** n=194 imputed;
proc freq; table imamd9_2_18; where d9_2_imp_18=1; run; *** n=66 imputed;
proc freq; table imamd9_3_18; where d9_3_imp_18=1; run; *** n=268 imputed;
proc freq; table imamd12a_18; where d12a_imp_18=1; run; *** n=407 imputed;
*/
/*
proc freq data=dd_1;
tables imamd9_1_18;
run;
*/
data imp.group4_core_health_imputed; set dd_1;
drop
lowd6_18 upd6_18 lowd9_1_18 upd9_1_18 lowd9_2_18 upd9_2_18 lowd9_3_18
upd9_3_18 lowd12a_18 upd12a_18;
run;
```

```
/******************************************************/
/* PROGRAM NAME : impute2018_group4_proxy.SAS */
/* PROGRAMMED BY : Lu Chen */
/* LAST UPDATEED : 3/2/2021 */
/* impute missing value on core and proxy questionnaire */
/******************************************************/
Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set input.Sect_a_c_d_f_e_pc_h_i_2018; ***core and proxy
questionnaire n=17,114 var=955;
proc sort out=temp nodupkey; by cunicah np; run; ***no duplicate;
proc freq ;table tipent_18; run;
/*proc contents data=aa;
run;
proc means data=aa;
var age_18;
run;*/
**** proxy N=1,328;
data aa1; set aa;
keep cunicah np age_18 sex_18 yrschool tipent_18 subhog_18
d4_18
d6_18 d7a_18 d7b_18 d7c_18
d8_1_18 d9_1_18 d10a1_18 d10b1_18 d10c1_18
d8_2_18 d9_2_18 d10a2_18 d10b2_18 d10c2_18
d8_3_18 d9_3_18 d10a3_18 d10b3_18 d10c3_18
d11_18 d12a_18 d12b_a_18 d12b_b_18 d12b_c_18;
if tipent_18 in (3,4); *1,2=direct;
run;
proc sort; by cunicah np; run;
/*
proc freq data=aa1;
tables sex_18 age_18 yrschool;
run;

proc freq data=aa2;
tables imamd12a_18;
run;

data tmp;
set aa2;
if d9_1_18m ^=9 and missing(imamd9_1_18);
run;
*/
***** define missing value;
data aa2; set aa1;
if age_18 in (888,999) then age_18=.; **** missing N=1;
if yrschool in (88,99) then yrschool=.; **** missing N=15;
amd_school=yrschool;
amd_age=age_18;
imamd6_18=d6_18; *total expense for hosp;**** N=48;
```

```
if d4_18=0 and missing(d6_18) then imamd6_18=0; *d4_18: #nights in hosp;
if d4_18 in(888,999) then d4_18m=9; **** create mix output variable; *=9
then 0 is possible;
if d4_18 >0 and d4_18 <888 and d6_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888) then imamd6_18=.;
if missing(imamd6_18) and missing(d7a_18) then d7a_18=9; *d7a_18:more than
$7500? 9=DK;
imamd9_1_18=d9_1_18; *total expense for dentist visit;**** N=71;
if d8_1_18=0 and missing(d9_1_18) then imamd9_1_18=0;
if d8_1_18>0 and d9_1_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_1_18=.;
if missing(imamd9_1_18) & d9_1_18 not in (777777) & (missing(d10a1_18) or
d10a1_18=9) & (missing(d10b1_18) or d10b1_18=9) & (missing(d10c1_18) or
d10c1_18=9) then d9_1_18m=9; *** create a mix output variable;
if missing(imamd9_1_18) and missing(d10a1_18) then d10a1_18=9; *d10a1_18:
more than $2000? 9=DK;
imamd9_2_18=d9_2_18; *total expense for outpatient service;**** N=18;
if d8_2_18=0 and missing(d9_2_18) then imamd9_2_18=0;
if d8_2_18>0 and d9_2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_2_18=.;
if missing(imamd9_2_18) & d9_2_18 not in (777777) & (missing(d10a2_18) or
d10a2_18=9) & (missing(d10b2_18) or d10b2_18=9) & (missing(d10c2_18) or
d10c2_18=9) then d9_2_18m=9;;
if missing(imamd9_2_18) and missing(d10a2_18) then d10a2_18=9;
imamd9_3_18=d9_3_18; *total expense for medical visit;**** N=63;
if d8_3_18=0 and missing(d9_3_18) then imamd9_3_18=0;
if d8_3_18>0 and d9_3_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777) then
imamd9_3_18=.;
if missing(imamd9_3_18) & d9_3_18 not in (777777) & (missing(d10a3_18) or
d10a3_18=9) & (missing(d10b3_18) or d10b3_18=9) & (missing(d10c3_18) or
d10c3_18=9) then d9_3_18m=9;
if missing(imamd9_3_18) and missing(d10a3_18) then d10a3_18=9;
imamd12a_18=d12a_18;*monthly expense for medications;**** N=89;
if d12a_18 in (9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,
777777) then imamd12a_18=.;
if missing(imamd12a_18) & d12a_18 not in (777777) & (missing(d12b_a_18) or
d12b_a_18=9) & (missing(d12b_b_18) or d12b_b_18=9) & (missing(d12b_c_18) or
d12b_c_18=9) then d12a_18m=9;
if missing(imamd12a_18) and missing(d12b_a_18) then d12b_a_18=9;
d6_imp_18=1*(missing(imamd6_18));
d9_1_imp_18=1*(missing(imamd9_1_18));
d9_2_imp_18=1*(missing(imamd9_2_18));
d9_3_imp_18=1*(missing(imamd9_3_18));
d12a_imp_18=1*(missing(imamd12a_18));
run;
/*
proc freq data=aa2;
tables age_18 yrschool d6_imp_18 d9_1_imp_18 d9_2_imp_18 d9_3_imp_18
d12a_imp_18;
```

```
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah np subhog_18 tipent_18 yrschool sex_18 age_18 imam&vname
dum&vname
low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &va=1 and &vc=1 then do; low&vname=&r1_2; up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2; end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax; end;
if &va=2 and &vb=1 then do; low&vname=&r2_1; up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1; end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1; end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(d6_18,d7a_18,d7b_18,d7c_18,180000,7500,30000,4000,d4_18m); run;
%range(d9_1_18,d10a1_18,d10b1_18,d10c1_18, 45000,2000,15000,400,d9_1_18m);
run;
%range(d9_2_18,d10a2_18,d10b2_18,d10c2_18,36000,2000,15000,400,d9_2_18m);
run;
%range(d9_3_18,d10a3_18,d10b3_18,d10c3_18,180000,2000,15000,400,d9_3_18m);
run;
%range(d12a_18,d12b_a_18,d12b_b_18,d12b_c_18,96000,400,2000,200,d12a_18m);
run;
/*proc means data=aa2; var imamd6_18 imamd9_1_18 imamd9_2_18 imamd9_3_18
imamd12a_18; run;*/

data output.group4_proxy_health; merge datad6_18 datad9_1_18 datad9_2_18
datad9_3_18 datad12a_18;
by cunicah np;
drop d4_18m d9_1_18m d9_2_18m d9_3_18m d12a_18m;
label
imamd6_18="total hospital expense"
imamd9_1_18="total expense for dentist visit(s)"
imamd9_2_18="total expense for outpatient procedures"
imamd9_3_18="total expense for medical visits"
imamd12a_18="monthly medication expense";
run;

data dd1; set output.group4_proxy_health; run;
/*
proc freq data=dd1;
tables age_18;
run;
*/
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamd6_18 imamd9_1_18 imamd9_2_18 imamd9_3_18 imamd12a_18 yrschool;
transfer cunicah np tipent_18
lowd6_18 upd6_18 lowd9_1_18 upd9_1_18 lowd9_2_18 upd9_2_18 lowd9_3_18
upd9_3_18 lowd12a_18 upd12a_18
d6_imp_18
d9_1_imp_18
d9_2_imp_18
d9_3_imp_18
d12a_imp_18 ;
bounds imamd6_18(<=upd6_18,>=lowd6_18)
imamd9_1_18(<=upd9_1_18,>=lowd9_1_18)
imamd9_2_18(<=upd9_2_18,>=lowd9_2_18)
imamd9_3_18(<=upd9_3_18,>=lowd9_3_18)
imamd12a_18(<=upd12a_18,>=lowd12a_18)
yrschool(<=22, >=0)
age_18(<=102, >=16);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;

/* proc freq; table imamd6_18; where d6_imp_18=1; run; *** n=159 imputed;
proc freq; table imamd9_1_18; where d9_1_imp_18=1; run; *** n=194 imputed;
proc freq; table imamd9_2_18; where d9_2_imp_18=1; run; *** n=66 imputed;
proc freq; table imamd9_3_18; where d9_3_imp_18=1; run; *** n=268 imputed;
proc freq; table imamd12a_18; where d12a_imp_18=1; run; *** n=407 imputed;
*/
/*
proc freq data=dd_1;
tables imamd9_1_18;
run;
*/
data imp.group4_proxy_health_imputed; set dd_1;
drop
lowd6_18 upd6_18 lowd9_1_18 upd9_1_18 lowd9_2_18 upd9_2_18 lowd9_3_18
upd9_3_18 lowd12a_18 upd12a_18;
run;
```

```
/****************************************************/
/* PROGRAM NAME : Imput2018_group4_kin.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/14/2021 */
/* Impute missing value on Next-of-Kin questionnaire */
/****************************************************/
Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data bb; set output.sect_sa_sb_sc_sd_se_sh_si_2018; ***Next-of-Kin
questionnaire;
proc sort out=temp nodupkey; by cunicah np; run;
proc contents data=bb;
run;
/*
proc contents data=input.Sect_sa_sb_sc_sd_se_sh_si_2015;
run;
*/
data bb1; set bb;**** n=1,135;
keep cunicah np d_age_18 yob sex_18 yrschool
sd3_18 sd5_18 sd6a_18 sd6b_18 sd6c_18
sd7_18 sd8_18 sd9a_18 sd9b_18 sd9c_18
sd10a_18 sd10b1_18 sd10b2_18 sd10b3_18
sd11a_18
sd12a_18 sd12b_18 sd12c_18
sd13a_18 sd13b_18 sd13c_18;
*if tipent_15 in (5);
run;
proc sort; by cunicah np; run;

/*proc freq data=bb1; table yrschool; run;

data tmp;
set bb2;
if d_age_18=.;
run;

proc freq; tables d_age_18;run;*/

***** define missing value;
data bb2; set bb1;
imamsd5_18=sd5_18;**** impute n=80;
if sd3_18=0 and missing(sd5_18) then imamsd5_18=0;
if sd3_18>=888 and missing(sd5_18) then sd3_18m =9; ***mix imp variables;
if 888 > sd3_18 >0 and sd5_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,888889)
then do;
imamsd5_18=.;
sd5_18m=9; ***mix imp var;
end;
if missing(imamsd5_18) and missing(sd6a_18) then sd6a_18=9;
```

```
imamsd8_18=sd8_18;**** impute n=109;
if sd7_18=0 and missing(sd8_18) then imamsd8_18=0;
if sd7_18 >0 and sd8_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,888889)
then imamsd8_18=.;
if sd7_18 >0 and sd8_18 in (888888,999999) then sd8_18m=9; **** mix imp
variables;
if missing(imamsd8_18) and missing(sd9a_18) then sd9a_18=9;
imamsd10a_18=sd10a_18;**** impute n=125;
if sd10a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,999998,888889)
then imamsd10a_18=.;
if sd10a_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,999998,888889) then
sd10a_18m=9; ***mix imp var;
if missing(imamsd10a_18) and missing(sd10b1_18) then sd10b1_15=9;
imamsd12a_18=.;**** impute n=647;
if sd11a_18 = 8 then imamsd12a_18=0;
if sd11a_18 in (88,99) then sd11a_18m=9;
if sd12a_18=7 then imamsd12a_18=0;
if sd12a_18=9 then sd12a_18m=9;
imamsd13a_18=.;**** impute n=474;
if sd13a_18=7 then imamsd13a_18=0;
if sd13a_18 =9 then sd13a_18m=9; *** mix imp var;
sd5_imp_18=missing(imamsd5_18);
sd8_imp_18=missing(imamsd8_18);
sd10a_imp_18=missing(imamsd10a_18);
dumsd12a_18=missing(imamsd12a_18);
dumsd13a_18=missing(imamsd13a_18);
*define range of imputation for age;
if cunicah=890 and np=20 then do;
lowd_age_18=(2012-yob);
upd_age_18=(2018-yob);
end;
if cunicah=1103 and np=10 then do;
lowd_age_18=(2015-yob);
upd_age_18=(2018-yob);
end;
if cunicah=6257 and np=20 then do;
lowd_age_18=(2015-yob);
upd_age_18=(2018-yob);
end;
if cunicah=6347 and np=20 then do;
lowd_age_18=(2015-yob);
upd_age_18=(2018-yob);
end;
run;

***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
```

```
(keep=cunicah np yrschool sex_18 d_age_18 lowd_age_18 upd_age_18 imam&vname
dum&vname low&vname up&vname
&mix1 &mix2);
set bb2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2; up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;

%range(sd5_18,sd6a_18,sd6b_18,sd6c_18,700000,6000,24000,3000,sd3_18m,sd5_18m
);run;
%range(sd8_18,sd9a_18,sd9b_18,sd9c_18,428000,1500,12000, 300,sd8_18m); run;
%range(sd10a_18,sd10b1_18,sd10b2_18,sd10b3_18,150000,300,1500,150,sd10a_18m)
; run;
%range(sd12a_18,sd12a_18,sd12b_18,sd12c_18,24000,6000,24000,3000,sd11a_18m,s
d12a_18m); run;
%range(sd13a_18,sd13a_18,sd13b_18,sd13c_18,24000,6000,24000,3000,sd13a_18m);
run;
/*
proc means data=bb2;
var imamsd5_18 imamsd8_18 imamsd10a_18;
run;
*/
proc sort data=datasd5_18;
by cunicah np;;
run;

proc sort data=datasd8_18;
by cunicah np;;
run;

proc sort data=datasd10a_18;
by cunicah np;;
run;

proc sort data=datasd12a_18;
by cunicah np;;
run;

proc sort data=datasd13a_18;
by cunicah np;;
run;
```

```
data output.group4_kin_health;
merge datasd5_18 datasd8_18 datasd10a_18 datasd12a_18 datasd13a_18; ***
n=1135 var=27;
by cunicah np;
drop sd3_18m sd5_18m sd8_18m sd10a_18m sd11a_18m sd12a_18m sd13a_18m;
run;

data dd1;
set output.group4_kin_health;
keep cunicah np d_age_18 lowd_age_18 upd_age_18 sex_18 yrschool
imamsd5_18 sd5_imp_18 lowsd5_18 upsd5_18
imamsd8_18 sd8_imp_18 lowsd8_18 upsd8_18
imamsd10a_18 sd10a_imp_18 lowsd10a_18 upsd10a_18
;
run;
/*
proc means data=dd1;
var yrschool;
run;
*/
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count d_age_18;
mixed imamsd5_18 imamsd8_18 imamsd10a_18 yrschool;
transfer cunicah np
lowd_age_18 upd_age_18
lowsd5_18 upsd5_18 lowsd8_18 upsd8_18 lowsd10a_18 upsd10a_18
sd5_imp_18 sd8_imp_18 sd10a_imp_18;
bounds imamsd5_18(<=upsd5_18,>=lowsd5_18)
imamsd8_18(<=upsd8_18,>=lowsd8_18)
imamsd10a_18(<=upsd10a_18,>=lowsd10a_18)
yrschool(<=19, >=0)
d_age_18(<=upd_age_18, >=lowd_age_18);
INTERACT d_age_18*sex_18 d_age_18*d_age_18 sex_18*yrschool
yrschool*yrschool;
iterations 10;
*multiples 5;
seed 2018;
run;

data dd1; set output.group4_kin_health;
keep cunicah np d_age_18 lowd_age_18 upd_age_18 sex_18 yrschool
imamsd12a_18 dumsd12a_18 lowsd12a_18 upsd12a_18
imamsd13a_18 dumsd13a_18 lowsd13a_18 upsd13a_18
; run;
```

```
options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_2;
categorical sex_18;
count d_age_18;
mixed imamsd12a_18 imamsd13a_18 yrschool;
transfer cunicah np
lowd_age_18 upd_age_18
lowsd12a_18 upsd12a_18 lowsd13a_18 upsd13a_18
dumsd12a_18 dumsd13a_18;
bounds imamsd12a_18(<=upsd12a_18,>=lowsd12a_18)
imamsd13a_18(<=upsd13a_18,>=lowsd13a_18)
yrschool(<=19, >=0)
d_age_18(<=upd_age_18, >=lowd_age_18);
INTERACT d_age_18*sex_18 d_age_18*d_age_18 sex_18*yrschool
yrschool*yrschool;
iterations 10;
*multiples 5;
seed 2018;
run;

data imp.group4_kin_health_imputed; merge dd_1 dd_2; by cunicah np;
drop
lowd_age_18 upd_age_18 lowsd5_18 upsd5_18 lowsd8_18 upsd8_18 lowsd10a_18
upsd10a_18
lowsd12a_18 upsd12a_18 lowsd13a_18 upsd13a_18 ;
run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group4_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/15/2021 */
/*
*/
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

*************** core **************;
data out1;
merge output.group4_core_health;
by cunicah np;
rename imamd6_18=amd6_18 imamd9_1_18=amd9_1_18 imamd9_2_18=amd9_2_18
imamd9_3_18=amd9_3_18 imamd12a_18=amd12a_18;
run;

data imp1;
merge imp.Group4_core_health_imputed;
by cunicah np; run;
data out_imp1;
merge out1 imp1;
by cunicah np;
run;

*** print putput;
Title "Group4 core health - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amd6_18 imamd6_18 amd9_1_18 imamd9_1_18 amd9_2_18 imamd9_2_18
amd9_3_18 imamd9_3_18 amd12a_18 imamd12a_18;
; run;

Title "Group4 core health - mean without zero";
data out_imp2; set out_imp1;
if imamd6_18 =0 then imamd6_18 =.;
if imamd9_1_18 =0 then imamd9_1_18 =.;
if imamd9_2_18 =0 then imamd9_2_18 =.;
if imamd9_3_18 =0 then imamd9_3_18 =.;
if imamd12a_18 =0 then imamd12a_18 =.;

if amd6_18 =0 then amd6_18 =.;
if amd9_1_18 =0 then amd9_1_18 =.;
if amd9_2_18 =0 then amd9_2_18 =.;
if amd9_3_18 =0 then amd9_3_18 =.;
if amd12a_18 =0 then amd12a_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amd6_18 imamd6_18 amd9_1_18 imamd9_1_18 amd9_2_18 imamd9_2_18
amd9_3_18 imamd9_3_18 amd12a_18 imamd12a_18;
```

```
; run;

*************** proxy **************;
data out1;
set output.Group4_proxy_health;
by cunicah np;
rename imamd6_18=amd6_18 imamd9_1_18=amd9_1_18 imamd9_2_18=amd9_2_18
imamd9_3_18=amd9_3_18 imamd12a_18=amd12a_18;
run;
data imp1;
merge imp.Group4_proxy_health_imputed;
by cunicah np; run;
data out_imp1;
merge out1 imp1;
by cunicah np;
run;

*** print putput;
Title "Group4 proxy health - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amd6_18 imamd6_18 amd9_1_18 imamd9_1_18 amd9_2_18 imamd9_2_18
amd9_3_18 imamd9_3_18 amd12a_18 imamd12a_18;
; run;

Title "Group4 proxy health - mean without zero";
data out_imp2; set out_imp1;
if imamd6_18 =0 then imamd6_18 =.;
if imamd9_1_18 =0 then imamd9_1_18 =.;
if imamd9_2_18 =0 then imamd9_2_18 =.;
if imamd9_3_18 =0 then imamd9_3_18 =.;
if imamd12a_18 =0 then imamd12a_18 =.;

if amd6_18 =0 then amd6_18 =.;
if amd9_1_18 =0 then amd9_1_18 =.;
if amd9_2_18 =0 then amd9_2_18 =.;
if amd9_3_18 =0 then amd9_3_18 =.;
if amd12a_18 =0 then amd12a_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amd6_18 imamd6_18 amd9_1_18 imamd9_1_18 amd9_2_18 imamd9_2_18
amd9_3_18 imamd9_3_18 amd12a_18 imamd12a_18;
; run;

********************** Kin ******************************;
data out1;
set output.group4_kin_health;
by cunicah np;
rename imamsd5_18=amsd5_18 imamsd8_18=amsd8_18 imamsd10a_18=amsd10a_18
imamsd12a_18=amsd12a_18 imamsd13a_18=amsd13a_18;
run;

data imp1;
```

```
merge imp.group4_kin_health_imputed;
by cunicah np; run;
data out_imp1;
merge out1 imp1;
by cunicah np;
run;

*** print putput;
Title "Group4 kin health - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amsd5_18 imamsd5_18 amsd8_18 imamsd8_18 amsd10a_18 imamsd10a_18
amsd12a_18 imamsd12a_18 amsd13a_18 imamsd13a_18;
; run;

Title "Group4 kin health - mean without zero";
data out_imp2; set out_imp1;
if imamsd5_18 =0 then imamsd5_18 =.;
if imamsd8_18 =0 then imamsd8_18 =.;
if imamsd10a_18 =0 then imamsd10a_18 =.;
if imamsd12a_18 =0 then imamsd12a_18 =.;
if imamsd13a_18 =0 then imamsd13a_18 =.;

if amsd5_18 =0 then amsd5_18 =.;
if amsd8_18 =0 then amsd8_18 =.;
if amsd10a_18 =0 then amsd10a_18 =.;
if amsd12a_18 =0 then amsd12a_18 =.;
if amsd13a_18 =0 then amsd13a_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amsd5_18 imamsd5_18 amsd8_18 imamsd8_18 amsd10a_18 imamsd10a_18
amsd12a_18 imamsd12a_18 amsd13a_18 imamsd13a_18;
; run;
```

GROUP 5. Household Monthly Rent

```
/******************************************************/
/* PROGRAM NAME : Imput2018_group5_core_housing.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/15/2021 */
/* Impute missing value on core and proxy questionnaire */
/******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.Sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** Core questionnaire N=10718;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j19_18 j20_18 j21a_18 j21b_18 J21c_18
;
if tipent_hh_18 in (1); run;
/*
proc freq data=aa2;
tables age_18 yrschool;
run;
*/
data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
imamj20_18=j20_18;**** Imputation N=30;
if j19_18 ne 1 and missing(j20_18) then imamj20_18=0;
if j19_18=1 and j20_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamj20_18=.;
if missing(imamj20_18) and missing(j21a_18) then j21a_18=9;
j20_imp_18=missing(imamj20_18);
run;
/*
data tmp;
set aa2;
if missing(imamj20_18);
run;
proc freq data=aa2;
tables j20_imp_18;
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
```

```
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(j20_18,j21a_18,j21b_18,J21c_18, 80000,6000,18000,2000); run;
/*
proc means data=aa2;
var age_18 yrschool;
run;
*/
data output.group5_core_housing; set dataj20_18 ; run;
data dd1; set output.group5_core_housing; run; **** Core nonproxy N=10718
var=10;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamj20_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj20_18 upj20_18 j20_imp_18
;
bounds
imamj20_18 (>=lowj20_18 ,<=upj20_18)
yrschool(<=22, >=0)
age_18(<=102, >=18);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;
```

```
data data imp.group5_core_housing_imputed; set dd_1;
drop lowj20_18 upj20_18
; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group5_proxy_housing.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/15/2021 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.Sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** proxy questionnaire N=683;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
j19_18 j20_18 j21a_18 j21b_18 J21c_18
;
if tipent_hh_18 in (2); run;
/*
proc freq data=aa1;
tables age_18 yrschool;
run;
*/
data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
imamj20_18=j20_18;**** Imputation N=3;
if j19_18 ne 1 and missing(j20_18) then imamj20_18=0;
if j19_18=1 and j20_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamj20_18=.;
if missing(imamj20_18) and missing(j21a_18) then j21a_18=9;
j20_imp_18=missing(imamj20_18);
run;
/*
data tmp;
set aa2;
if missing(imamj20_18);
run;
proc freq data=aa2;
tables j20_imp_18;
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
```

```
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(j20_18,j21a_18,j21b_18,J21c_18, 80000,6000,18000,2000); run;
/*
proc means data=aa2;
var age_18 yrschool;
run;
*/
data output.group5_proxy_housing; set dataj20_18 ; run;
data dd1; set output.group5_proxy_housing; run; **** Core nonproxy N=683
var=10;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamj20_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowj20_18 upj20_18 j20_imp_18
;
bounds
imamj20_18 (>=lowj20_18 ,<=upj20_18)
yrschool(<=22, >=0)
age_18(<=102, >=18);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;
```

```
data data imp.group5_proxy_housing_imputed; set dd_1;
drop lowj20_18 upj20_18
; run;
```

```
/******************************************************/
/* PROGRAM NAME : Imput2018_group5_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/15/2021 */
/*
*/
/******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

************** core **************;
data out1;
merge output.Group5_core_housing;
by cunicah subhog_18;
rename imamj20_18=amj20_18;
run;

data imp1;
merge imp.Group5_core_housing_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18;
run;

*** print putput;
Title "Group5 core Housing - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amj20_18 imamj20_18;
; run;

Title "Group5 core Housing - mean without zero";
data out_imp2; set out_imp1;
if imamj20_18 =0 then imamj20_18 =.;

if amj20_18 =0 then amj20_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amj20_18 imamj20_18;
; run;

************** proxy **************;
data out1;
merge output.Group5_proxy_housing;
by cunicah subhog_18;
rename imamj20_18=amj20_18;
run;

data imp1;
merge imp.Group5_proxy_housing_imputed;
```

```
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18;
run;

*** print putput;
Title "Group5 proxy Housing - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amj20_18 imamj20_18;
; run;

Title "Group5 proxy Housing - mean without zero";
data out_imp2; set out_imp1;
if imamj20_18 =0 then imamj20_18 =.;

if amj20_18 =0 then amj20_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amj20_18 imamj20_18;
; run;
```

GROUP 6. Pensions Income

```
/*****************************************************/
/* PROGRAM NAME : Imput2018_group6_core_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 5/10/2021 */
/* Impute missing value on core and proxy questionnaire */
/*****************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.Sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** Core questionnaire N=10718;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k100_18 k101_18 k102a_18 k102b_18 k102c_18
k103_18 k104a_18 k104b_18 k104c_18
k98_18 k111_18 k112a_18 k112b_18 k112c_18;
if tipent_hh_18 in (1); run;

/*
proc freq data=aa2;
tables k101_imp_18 k103_imp_18 k111_imp_18;
run;
*/
data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
if missing(k98_18)=0; ****483;
imamk101_18=k101_18;**** Imputation N=4;
if k100_18 in (1,4,5) and missing(k101_18) then imamk101_18=0;
if k100_18 in (8,9) then k100_18m=9; ** mix imp var;
if k100_18 in (2,3) and k101_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk101_18=.;
if missing(imamk101_18) and missing(k102a_18) then k102a_18=9;
imamk103_18=k103_18;**** Imputation N=8;
if k100_18 in (4,5) and missing(k103_18) then imamk103_18=0;
if k100_18 in (8,9) then k100_18m=9; ** mix imp var;
if k100_18 in(1,2,3) and k103_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamk103_18=.;
if k100_18 in(1,2,3) and k103_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then k103_18m=9; ** mix imp var; *????;
if missing(imamk103_18) and missing(k104a_18) then k104a_18=9;
imamk111_18=k111_18;**** Imputation N=124;
if missing(k111_18) then imamk111_18=0;
```

```
if k111_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk111_18=.;
if k111_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then k111_18m=9;
k101_imp_18=missing(imamk101_18);
k103_imp_18=missing(imamk103_18);
k111_imp_18=missing(imamk111_18);
run;

**************;
/*
data tmp;
set aa2;
if missing(imamj20_18);
run;
proc freq data=aa2;
tables j20_imp_18;
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k101_18,k102a_18,k102b_18,k102c_18, 30000,2000,7500,950,k100_18m);
run;
%range(k103_18,k104a_18,k104b_18,k104c_18,47000,2000,7500,95,k100_18m,k103_1
8m);run;
%range(k111_18,k112a_18,k112b_18,k112c_18,500000,7500,30000,4000,k111_18m);
run;
```

```
/*
proc means data=aa2;
var age_18 yrschool imamk101_18 imamk103_18 imamk111_18;
run;
*/

data output.group6_core_pension; *****483 var=18;
merge datak101_18 datak103_18 datak111_18 ;
by cunicah subhog_18;
drop k100_18m k103_18m k111_18m;
run;

data dd1; set output.group6_core_pension; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamk101_18 imamk103_18 imamk111_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk101_18 upk101_18
lowk103_18 upk103_18
lowk111_18 upk111_18
k101_imp_18
k103_imp_18
k111_imp_18
;
bounds
imamk101_18 (>=lowk101_18 ,<=upk101_18)
imamk103_18 (>=lowk103_18 ,<=upk103_18)
imamk111_18 (>=lowk111_18 ,<=upk111_18)
yrschool(<=19, >=0)
age_18(<=98, >=22);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;

data data imp.group6_core_pension_imputed; set dd_1;
drop
lowk101_18 upk101_18
lowk103_18 upk103_18
lowk111_18 upk111_18
; run;
```

```
/*****************************************************/
/* PROGRAM NAME : Imput2018_group6_proxy_pension.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 5/10/2021 */
/* Impute missing value on core and proxy questionnaire */
/*****************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.Sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;

***** proxy questionnaire N=683;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
k100_18 k101_18 k102a_18 k102b_18 k102c_18
k103_18 k104a_18 k104b_18 k104c_18
k98_18 k111_18 k112a_18 k112b_18 k112c_18;
if tipent_hh_18 in (2); run;

/*
proc freq data=aa;
tables tipent_hh_18;
run;
proc freq data=aa2;
tables k101_imp_18 k103_imp_18 k111_imp_18;
run;
*/
data aa2; set aa1;
if age_18 in (888,999) then age_18=.;
if missing(k98_18)=0; ****55;
imamk101_18=k101_18;**** Imputation N=1;
if k100_18 in (1,4,5) and missing(k101_18) then imamk101_18=0;
if k100_18 in (8,9) then k100_18m=9; ** mix imp var;
if k100_18 in (2,3) and k101_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk101_18=.;
if missing(imamk101_18) and missing(k102a_18) then k102a_18=9;
imamk103_18=k103_18;**** Imputation N=4;
if k100_18 in (4,5) and missing(k103_18) then imamk103_18=0;
if k100_18 in (8,9) then k100_18m=9; ** mix imp var;
if k100_18 in(1,2,3) and k103_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk103_18=.;
if k100_18 in(1,2,3) and k103_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then k103_18m=9; ** mix imp var; *????;
if missing(imamk103_18) and missing(k104a_18) then k104a_18=9;
imamk111_18=k111_18;**** Imputation N=12;
```

```
if missing(k111_18) then imamk111_18=0;
if k111_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then imamk111_18=.;
if k111_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,999999
9) then k111_18m=9;
k101_imp_18=missing(imamk101_18);
k103_imp_18=missing(imamk103_18);
k111_imp_18=missing(imamk111_18);
run;

**************;
/*
data tmp;
set aa2;
if missing(imamj20_18);
run;
proc freq data=aa2;
tables j20_imp_18;
run;
*/
***** define range of imputation;
%macro range(vname,va,vb,vc,rmax,r1,r1_2,r2_1,mix1,mix2);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1 &mix2);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 and &vb=1 then do; low&vname=&r2_1;
up&vname=&r1; end;
if &va=2 and &vb=2 then do; low&vname=1; up&vname=&r2_1;
end;
if &va=2 and &vb=9 then do; low&vname=1; up&vname=&r1;
end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
if &mix2 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(k101_18,k102a_18,k102b_18,k102c_18, 30000,2000,7500,950,k100_18m);
run;
%range(k103_18,k104a_18,k104b_18,k104c_18,17000,2000,7500,95,k100_18m,k103_1
8m);run;
```

```
%range(k111_18,k112a_18,k112b_18,k112c_18,200000,7500,30000,4000,k111_18m);
run;
/*
proc means data=aa2;
var age_18 yrschool imamk101_18 imamk103_18 imamk111_18;
run;

data tmp;
set dd1;
if k103_imp_18=1;
run;
*/

data output.group6_proxy_pension; *****55 var=18;
merge datak101_18 datak103_18 datak111_18 ;
by cunicah subhog_18;
drop k100_18m k103_18m k111_18m;
run;

data dd1; set output.group6_proxy_pension; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamk101_18 imamk103_18 imamk111_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowk101_18 upk101_18
lowk103_18 upk103_18
lowk111_18 upk111_18
k101_imp_18
k103_imp_18
k111_imp_18
;
bounds
imamk101_18 (>=lowk101_18 ,<=upk101_18)
imamk103_18 (>=lowk103_18 ,<=upk103_18)
imamk111_18 (>=lowk111_18 ,<=upk111_18)
yrschool(<=16, >=0)
age_18(<=97, >=53);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
*multiples 5;
seed 2018;
run;
```

```
data data imp.group6_proxy_pension_imputed; set dd_1;
drop
lowk101_18 upk101_18
lowk103_18 upk103_18
lowk111_18 upk111_18
; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group6_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 5/11/2021 */
/*
 */
/*******************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

*************** core **************;
data out1;
merge output.group6_core_pension;
by cunicah subhog_18;
rename imamk101_18=amk101_18 imamk103_18=amk103_18 imamk111_18=amk111_18;
run;

data imp1;
merge imp.Group6_core_pension_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18;
run;

*** print putput;
Title "Group6 core pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk101_18 imamk101_18 amk103_18 imamk103_18 amk111_18 imamk111_18;
; run;

Title "Group6 core pension - mean without zero";
data out_imp2; set out_imp1;
if imamk101_18 =0 then imamk101_18 =.;
if imamk103_18 =0 then imamk103_18 =.;
if imamk111_18 =0 then imamk111_18 =.;

if amk101_18 =0 then amk101_18 =.;
if amk103_18 =0 then amk103_18 =.;
if amk111_18 =0 then amk111_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk101_18 imamk101_18 amk103_18 imamk103_18 amk111_18 imamk111_18;
; run;

*************** proxy **************;
data out1;
merge output.group6_proxy_pension;
by cunicah subhog_18;
rename imamk101_18=amk101_18 imamk103_18=amk103_18 imamk111_18=amk111_18;
```

```
run;

data imp1;
merge imp.Group6_proxy_pension_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18;
run;

*** print putput;
Title "Group6 proxy pension - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amk101_18 imamk101_18 amk103_18 imamk103_18 amk111_18 imamk111_18;
; run;

Title "Group6 proxy pension - mean without zero";
data out_imp2; set out_imp1;
if imamk101_18 =0 then imamk101_18 =.;
if imamk103_18 =0 then imamk103_18 =.;
if imamk111_18 =0 then imamk111_18 =.;

if amk101_18 =0 then amk101_18 =.;
if amk103_18 =0 then amk103_18 =.;
if amk111_18 =0 then amk111_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amk101_18 imamk101_18 amk103_18 imamk103_18 amk111_18 imamk111_18;
; run;
```

```
/*******************************************************/
/* PROGRAM NAME : Imput2018_group7_core_help.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/20/2021 */
/* Impute missing value on core and proxy questionnaire */
/*******************************************************/
Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

data aa; set output.sect_g_j_k_sa_2018; *** core and proxy questionnaire
N=11401;
proc sort out=temp nodupkey; by cunicah subhog_18; run; *** no duplicate;
***** Core questionnaire N=10718;
data aa1; set aa;
keep cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18
g7_18
g8c1_18 g8c2_18 g8c_monthly g8d1_18 g8d2_18
;
if tipent_hh_18 in (1); run;

/*
proc freq data=aa2;
tables g8c_imp_18;
run;

data tmp;
set aa2;
if imamg8c_18=320000;
run;
*/
data aa2; set aa1;
if age_18 in (888, 999) then age_18=.;
imamg8c_18=g8c_monthly; **** Imputation N=322;
if (g7_18 = 2 or missing(g7_18)) and missing(g8c_monthly) then imamg8c_18=0;
if g7_18=1 and G8c2_18 in
(9,99,999,9999,99999,999999,8,88,888,8888,88888,888888,777777,8888888,9999999
9) then imamg8c_18=.;
if missing(imamg8c_18) and missing(g8d1_18) then g8d1_18=9;
g8c_imp_18=missing(imamg8c_18);
run;

***** define range of imputation;
%macro range(vname,va,vc,rmax,r1,r1_2,mix1);
data data&vname
(keep=cunicah subhog_18 tipent_hh_18 yrschool sex_18 age_18 imam&vname
dum&vname low&vname up&vname &mix1);
set aa2;
low&vname=1; up&vname=&rmax ;
if &va=1 and &vc=1 then do; low&vname=&r1_2;
up&vname=&rmax; end;
if &va=1 and &vc=2 then do; low&vname=&r1; up&vname=&r1_2;
```

```
end;
if &va=1 and &vc=9 then do; low&vname=&r1; up&vname=&rmax;
end;
if &va=2 then do; low&vname=1; up&vname=&r1; end;
if &va=9 then do; low&vname=1; up&vname=&rmax; end;
if imam&vname >=0 then do; low&vname=imam&vname; end;
if imam&vname >=0 then do; up&vname=imam&vname; end;
if &mix1 in (8,9) then do; low&vname=0; up&vname=&rmax; end;
%mend range;
%range(g8c_18,g8d1_18, g8d2_18,320000,250,500,g7_18); run;

proc means data=aa2;
var imamg8c_18 age_18;
run;

data output.group7_core_help; merge datag8c_18;
by cunicah subhog_18; run;

data dd1; set output.group7_core_help;
drop g7_18; run;

options set = SRCLIB 'C:\Program Files\Srcware\sas' sasautos = ('!SRCLIB'
sasautos) mautosource;
/* run iveware */
/* multiple imputation */
%impute(name=impute,dir=.,setup=new)
title Multiple imputation;
datain dd1;
dataout dd_1;
categorical sex_18;
count age_18;
mixed imamg8c_18 yrschool;
transfer cunicah subhog_18 tipent_hh_18
lowg8c_18 upg8c_18 g8c_imp_18;
bounds imamg8c_18(<=upg8c_18,>=lowg8c_18)
yrschool(<=22, >=0)
age_18(<=102, >=18);
INTERACT age_18*sex_18 age_18*age_18 sex_18*yrschool yrschool*yrschool ;
iterations 10;
/*multiples 5;*/
seed 2018;
run;

data imp.group7_core_help_imputed; set dd_1; ***** 10718 var=8;
drop lowg8c_18 upg8c_18
; run;
```

```
/*****************************************************/
/* PROGRAM NAME : Imput2018_group7_report.SAS */
/* PROGRAMMED BY : LU CHEN */
/* LAST UPDATEED : 4/21/2021 */
/*
*/
/*****************************************************/

Libname input 'D:\LuChen\MHAS\Data\Raw'; run;
libname output 'D:\LuChen\MHAS\Data\Output\2018'; run;
libname imp 'D:\LuChen\MHAS\Data\Imputed\2018'; run;

************** core **************;
data out1;
merge output.Group7_core_help;
by cunicah subhog_18;
rename imamg8c_18=amg8c_18;
run;

data imp1;
merge imp.Group7_core_help_imputed;
by cunicah subhog_18; run;
data out_imp1;
merge out1 imp1;
by cunicah subhog_18;
run;

*** print putput;
Title "Group7 core help given - mean with zero";
proc means data=out_imp1 n nmiss mean std min max ;
variable amg8c_18 imamg8c_18;
; run;

Title "Group7 core help given - mean without zero";
data out_imp2; set out_imp1;
if imamg8c_18 =0 then imamg8c_18 =.;

if amg8c_18 =0 then amg8c_18 =.;
run;
proc means data=out_imp2 n mean std min max ;
variable amg8c_18 imamg8c_18;
; run;
```