**Supplementary material**

**Table S1: Unit costs associated with health, social, justice services and welfare benefits**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cost items** | **Unit costs (€)\*** | **Sources** | **HF (N=353)** | | **TAU (N=350)** | |
| ***Health services*** |  |  | *N* | *Mean unit*  *over 2 years* | *N* | *Mean unit*  *over 2 years* |
| Hospitalizations - psychiatric hospital (public) | 620/day | Financial Statements Price Report 2011 ARS/CHU | 161 | 33.1 | 171 | 46.9 |
| Hospitalizations - psychiatric hospital (private) | 260/day | BAQIMEHP 2006 | 43 | 5.5 | 62 | 13 |
| Hospitalizations – medical (public) | 570/day | ENC MCO 2016 | 83 | 4.5 | 110 | 6.8 |
| Hospitalizations – medical (private) | 300/day | ENC MCO 2016 | 28 | 1.6 | 26 | 2.0 |
| Nursing and long-term care facilities (public) | 320/day | Weighted mean according to GME, PMSI SSR 2012 | 9 | 1.0 | 17 | 3.1 |
| Nursing and long-term care facilities (private) | 408/day | ATIH – Scan santé  https://www.scansante.fr | 21 | 2.2 | 15 | 1.6 |
| ED visits | 170/visit | Rapport of the social welfare system 2017, p370 | 218 | 2.2 | 235 | 2.5 |
| Health rehabilitation residential program | 110/day | Inter-ministerial circular, Sept. 2013 | 45 | 4.4 | 33 | 26.3 |
| Therapeutic apartment | 139/day | Financial Statements Price Report 2011 ARS/CHU | 13 | 0.2 | 10 | 0.5 |
| Harm Reduction centers | 1,200/year  (12/contact) | OFDT 2015 | 140 | 2.1 | 100 | 5.1 |
| Outpatient consultations (General practitioner) | 23/visit | NGAP - www.amelie.fr | 189 | 15.4 | 227 | 24.7 |
| Outpatient consultations (Psychiatrist) | 39/visit | NGAP - www.amelie.fr | 314 | 24.4 | 316 | 28.4 |
| Outpatient consultations (Other specialist) | 25/visit | NGAP - www.amelie.fr | 268 | 30.2 | 268 | 34.4 |
| ***Social services*** |  |  |  |  |  |  |
| Emergency shelters | 33/day | ENC 2011 | 52 | 9.1 | 121 | 46.4 |
| Transitional shelters | 43/day | DIHAL 2012 | 27 | 9.2 | 146 | 104.4 |
| IML(housing subsidies) in social sector | 16/day | Lolf 2012 | 7 | 2.4 | 87 | 50.6 |
| ***Justice services*** | ***Unit cost per unit*** |  |  |  |  |  |
| Court appearances | 1,831/appearance | OFDT (2013). Drugs and addictions, essential data, Saint-Denis, OFDT, 399 p. | 116 | 0.8 | 129 | 1.1 |
| Transitional prison (awaiting for judgement or sentence of less than 2 years) | 85/day | Ministry of Justice- DIHAL | 66 | 0.3 | 77 | 0.4 |
| Detention centre (including reinsertion approach) | 98/day | Ministry of Justice - DIHAL | 3 | 0.3 | 4 | 0.1 |
| Detention centre with high level of security | 196/day | Ministry of Justice - DIHAL | 4 | 2.0 | 8 | 4.0 |
| Penitentiary centre (mixed structure) | 96/day | Ministry of Justice - DIHAL | 43 | 19.5 | 49 | 20.6 |
| ***Welfare benefits*** | Self-reported and amount checked with official data when possible including housing allowances (APL), disability benefits (AAH), income support (RSA/job seekers’ allowances), and family allowances (CAF) | | N | Mean amount per month | N | Mean amount  per month |
|  |  | APL | 148 | 250 | 91 | 245 |
|  |  | AAH | 230 | 750 | 201 | 740 |
|  |  | RSA | 60 | 450 | 55 | 450 |
|  |  | Job seekers’ allowance | 16 | 550 | 11 | 540 |
|  |  | Family allowances | 3 | 150 | 2 | 200 |
|  |  |  |  |  |  |  |
| ***Housing First Intervention*** | **Unit costs (€)\*** |  |  |  |  |  |
| Total intervention costs (including housing subsidies (IML) and support team) |  | DIHAL 2018 | HF  (N) | Mean (pooled) over 2 years | TAU  (N) | Mean (pooled) over 2 years |
| - IML (housing subsidies) | 7,000/year  (18/day) |  | 328 | 26,772 | 0 | 0 |
| - a flat rate/single price for ACT team | 7,000/year  (18/day) |  |

*\*: When necessary, unit costs were adjusted to 2017 values.*

HF : Housing First ; TAU : Treatment as usual ; ARS: Regional Health Agency; ATIH: Technical Agency for Hospitalization Information; BAQIMEHP: Office of Quality Assurance and Medical-Economic Information of Private Hospitalization; CHU: University Hospital Centre; DIHAL: Interministerial delegation for accommodation and access to housing; ED: Emergency Department; ENC: National Cost Study; GME; Medical-Economic Group; IML: Rental intermediation; LOLF: Organic law on the finance; MCO: Obstetrical Surgical Medicine; NGAP: General nomenclature of professional acts; OFDT: French Observatory for Drugs and Drug Addiction; PMSI; Medical Information Systems Medicalization Program; SD: Standard deviation; SSR: Nursing and long-term care facilities.

**Table S2: ETHOS – European Typology of Homelessness and Housing Exclusion**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Operational Category** | | **Living Situation** | | **Generic Definition** |
| ROOFLESS | 1 | People Living Rough | 1.1 | Public space or external space | Living in the streets or public spaces, without a shelter that can be defined as living quarters |
| 2 | People in emergency accommodation | 2.1 | Night shelter | People with no usual place of residence who make use of overnight shelter, low threshold shelter |
| HOUSELESS | 3 | People in accommodation for the homeless | 3.1 | Homeless hostel | Where the period of stay is intended to be short term |
| 3.2 | Temporary Accommodation |
| 3.3 | Transitional supported accommodation |
| 4 | People in Women’s Shelter | 4.1 | Women’s shelter accommodation | Women accommodated due to experience of domestic violence and where the period of stay is intended to be short term |
| 5 | People in accommodation for immigrants | 5.1 | Temporary accommodation /  reception centres | Immigrants in reception or short term accommodation due to their immigrant status |
| 5.2 | Migrant workers accommodation |
| 6 | People due to be released from institutions | 6.1 | Penal institutions | No housing available prior to release |
| 6.2 | Medical institutions (\*) | Stay longer than needed due to lack of housing |
| 6.3 | Children’s institutions / homes | No housing identified (e.g by 18th birthday) |
| 7 | People receiving longer-term support (due to homelessness) | 7.1 | Residential care for older homeless people | Long stay accommodation with care for formerly homeless people (normally more than one year) |
|  | 7.2 | Supported accommodation for formerly  homeless people |
| INSECURE | 8 | People living in insecure accommodation | 8.1 | Temporarily with family/friends | Living in conventional housing but not the usual or place of residence due to lack of housing |
| 8.2 | No legal (sub)tenancy | Occupation of dwelling with no legal tenancy illegal occupation of a dwelling |
| 8.3 | Illegal occupation of land | Occupation of land with no legal rights |
| 9 | People living under threat of eviction | 9.1 | Legal orders enforced (rented) | Where orders for eviction are operative |
| 9.2 | Re-possession orders (owned) | Where mortagee has legal order to re-possess |
| 10 | People living under threat of violence | 10.0 | Police recorded incidents | Where police action is taken to ensure place of safety for victims of domestic violence |
| INADEQUATE | 11 | People living in temporary / non-conventional structures | 11.1 | Mobile homes | Not intended as place of usual residence |
| 11.2 | Non-conventional building | Makeshift shelter, shack or shanty |
| 11.3 | Temporary structure | Semi-permanent structure hut or cabin |
| 12 | People living in unfit housing | 12.1 | Occupied dwellings unfit for habitation | Defined as unfit for habitation by national legislation or building regulations |
| 13 | People living in extreme overcrowding | 13.1 | Highest national norm of overcrowding | Defined as exceeding national density standard for floor-space or useable rooms |

Note: Short stay is defined as normally less than one year; Long stay is defined as more than one year.

This definition is compatible with Census definitions as recommended by the UNECE/EUROSTAT report (2006).Source: adapted from FEANTSA, 2007

**Table S3: Detailed description of the measures derived from scales**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Score or Index** | **Mean (SD)** | **Cronbach’s alpha** | **Min** | **Max** | **Sources** |
| RAS | Score | 86.2 (14.3) | NA | 24 | 120 | Girard *et al.,* 2017 |
| PCAH | Score | 32.3 (6.1) | 0.80 | 9 | 45 |
| WAFH | Score | 10.6 (3.1) | 0.87 | 3 | 15 |
| GOSU | Score | 19.8 (3.7) | 0.81 | 5 | 25 |
| RELON | Score | 14.2 (3.7) | 0.79 | 4 | 20 |
| NDSYM | Score | 9.3 (3.1) | 0.80 | 3 | 15 |
| Calculated index | Index | NA | NA | 0 | 100 |
| MCSI | Score | NA | 0.90 | 14 | 70 | Conrad *et al.,* 2001 |
| MARS | Score | NA | 0.75 | 0 | 10 | Thompson *et al.,* 2000 |
| PCS | Score | NA | 0.79 to 0.95 | 0 | 100 | Ware & Sherbourne, 1922 Leplège *et al.,* 1995 |
| MCS | Score | NA | 0 | 100 |
| SQOL | Index | 56.4 (18.8) | 0.88 | 0 | 100 | Boyer et al 2010 |
| PsW | Score | 61.5 (29.3) | 0.73 | 0 | 100 |
| SE | Score | 58.5 (29.2) | 0.74 | 0 | 100 |
| RFa | Score | 63.5 (29.8) | 0.81 | 0 | 100 |
| RFr | Score | 48.5 (30.8) | 0.73 | 0 | 100 |
| RE | Score | 60.8 (26.3) | 0.74 | 0 | 100 |
| PhW | Score | 51.6 (26.4) | 0.79 | 0 | 100 |
| AU | Score | 61.0 (28.4) | 0.84 | 0 | 100 |
| SL | Score | 42.0 (31.0) | 0.72 | 0 | 100 |

NA: not applicable; SD: Standard deviation. HF: Housing First; TAU: treatment as usual; RAS: Recovery assessment scale; RAS dimensions: PCAH : Personal Confidence and Hope; WAFH : Willingness to Ask for Help; GOSU : Goal and Success Orientation; RELON : Reliance on Others; NDSYM : Not Dominated by Symptoms; MCSI: Modified Colorado symptom index; MARS: Medication Adherence Rating Scale; PCS: Physical composite score; MCS: Mental composite score; S-QoL: Schizophrenia Quality of Life Questionnaire; S-QoL dimensions: PsW: psychological well-being; SE: self-esteem; RFa: family relationships; RFr: relationships with friends; RE: resilience; PhW: physical well-being; AU: autonomy; and SL: sentimental life

**Methods S1: Multiple imputation**

This approach consists of creating several different plausible imputed data sets (step 1), analysing each of the completed data sets (step 2) and combining the results obtained into a final result - pooling (step 3). Multiple imputation (MI) creates multiple “complete” datasets by creating multiple predictions for each missing value. This procedure takes into account uncertainty in the imputations and yields accurate standard errors (Schafer and Graham 2002).

An attractive feature of MI is that the imputation and analysis models can be different. In our study, auxiliary variables which were considered to be highly correlated with the dropout process (predominantly based on interviewers and researchers experience), were employed to improve the imputation of the primary efficacy outcomes. In order to answer more accurately to the question of having MAR (missing at random) or MNAR (missing not at random) data, first we compared the characteristics of participants who dropped out of the study with the characteristics of those who were in contact with the interviewer until the end (M24). No differences were observed except between the sites. Second, we compared the number of days spent in hospitals and the number of nights spent in own house at the different times (6-, 12- and 18-month) between whose who responded at 24 months and those who dropped out during the study. No differences were observed in the TAU group (see below t-test results). The profiles for participants who withdrew do not appear to be different from those who remained on the intervention and the underlying MAR data assumption appears clinically plausible. We included all outcome variables at each follow-up time, including outcomes at baseline (again, whether or not they have missing data, also variables that are correlated with variables (whether or not they have missing data as well as additional predictive variables of missingness (i.e. auxiliary variables) (again, whether or not they have missing data) (for example: age, gender, age when first homeless, study groups, sites, schizophrenia or bipolar disorders at baseline). Covariates were not imputed (Azur et al 2011). When considering a scale or score as a dependent variable, we decided to include the summary measure of the entire scale/score because there were very little items’ missingness within each scale. On the contrary, for count variables and summary measures for healthcare use, we decided to include individual items. This had prevented the loss of observed information on study subjects. Data of participants who died or withdraw during the follow-up were imputed up to the date of events, except in the last data set, where all individuals, even those who died during the follow period, were imputed over the 24 months. The final pooled results were issued from combining the results obtained from each data set. For multivariate non-normal data with a monotone missing pattern (most of our primary outcomes), the imputation was performed by the sequential regression method, using “chained equations,” which imputes the data on a variable‐by‐variable basis by specifying a conditional model for each variable with all other variables as predictors. Imputation models were implemented using MICE by chained equations and mitools R packages. Sensitivity analyses were carried out to address the robustness of our results and the eventuality of data being MNAR. We performed several size for sets of imputation (m=5, m=20, m=50 and m=100). We observed stability in estimates after 5 imputations and therefore we kept the smaller one set for all analyses.

* Schafer JL, Graham JW. Missing data: our view of the state of the art. Psychol Methods. 2002 Jun; 7(2):147-77.
* Azur MJ, Stuart EA, Frangakis C, Leaf PJ. [Multiple imputation by chained equations: what is it and how does it work?](https://www.ncbi.nlm.nih.gov/pubmed/21499542) Int J Methods Psychiatr Res. 2011 Mar;20(1):40-9. doi: 10.1002/mpr.329.

**Table S4: Results of sensitivity analyses for primary endpoints and some secondary endpoints**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **End point** | **Type of analysis** | **HF**  **Mean (SE)** | **TAU**  **Mean (SE)** | **Estimated treatment difference**  **(HF vs TAU, (95%CI))** | **P-value** |
| **Inpatient stays** | |  |  |  |  |
| Over 2 years | Primary analysis on imputed data (n=633)£ | 2.05 (0.1) | 2.11 (0.2) | -0.08 (-0.56 to 0.39) | 0.449 |
|  | Complete cases analysis (N=230)§ | 1.8 (0.2) | 2.5 (0.3) | -0.64 (-1.4 to -11.8) | 0.419 |
|  | Analysis on imputed data using mean (N=703)% | 2.1 (0.1) | 2.2 (0.1) | -0.15(-0.45 to 0.16) | 0.347 |
|  | Analysis on imputed data using “Last observation carried forward” (LOCF) (N=676) & | 2.5 (0.2) | 2.6 (0.2) | -0.13 (-0.63 to 0.37) | 0.607 |
|  | Analysis on imputed data using worse-case scenario (N=676)@ | 2.8 (0.2) | 2.5 (0.2) | -0.43 (-0.07 to 0.93) | 0.092 |
| Over 6 months | Repeated measures on imputed data (N=633) | 0.49 (0.07) | 0.53 (0.07) | -0.03 (-0.14 to 0.06) | 0.479 |
|  | Repeated measures (N=499) | 0.48 (0.08) | 0.51 (0.09) | -0.03 (-0.16 to 0.09) | 0.591 |
| **Inpatient days** | |  |  |  |  |
| Over 2 years | Primary analysis on imputed data (n=633) | 51.8 (5.2) | 83.6 (6.9) | -31.8 (-48.7 to -14.9) | **<0.001** |
|  | Complete cases analysis (N=247) | 27.8 (4.1) | 57.8 (9.0) | -30.1 (-49.8 to -10.4) | **0.004** |
|  | Analysis on imputed data using mean data (N=703) | 39.7 (2.7) | 67.3 (4.1) | -27.5 (-37.1 to -17.9) | **<0.001** |
|  | Analysis on imputed data using “Last observation carried forward” (LOCF) (N=675) | 58.4 (5.9) | 70.5 (6.5) | -12.1 (-29.3 to 5.1) | 0.169 |
|  | Analysis on imputed data using worse-case scenario (N=675) | 71 (6.4) | 64 (5.9) | 6.7 (-10 to 24) | 0.443 |
| Over 6 months | Repeated measures on imputed data (N=633) | 13.1 (2.8) | 20.9 (2.8) | -7.7 (-12.2 to -3.3) | **0.001** |
|  | Repeated measures (N=505) | 10.4 (2.7) | 17.3 (2.9) | -6.9 (-11.5 to -2.4) | **0.003** |
| **Emergency department visits** | |  |  |  |  |
| Over 2 years | Primary analysis on imputed data (n=633) | 2.20 (0.2) | 2.47 (0.2) | -0.26 (-.98 to 0.44) | 0.187 |
|  | Complete cases analysis (N=230) | 2.1 (0.3) | 2.4 (0.4) | -0.34 (-1.3 to 0.66) | 0.791 |
|  | Analysis on imputed data using mean data (N=703) | 2.2 (0.2) | 2.3 (0.2) | -0.15 (-0.55 to 0.28) | 0.453 |
|  | Analysis on imputed data using “Last observation carried forward” (LOCF) (N=667) | 2.8 (0.2) | 3.2 (0.3) | -0.41 (-1.14 to 0.32) | 0.270 |
|  | Analysis on imputed data using worse-case scenario (N=667) | 3.2 (0.2) | 2.8 (0.3) | 0.34 (-0.37 to 1.05) | 0.343 |
| Over 6 months | Repeated measures on imputed data (N=633) | 0.55 (0.1) | 0.63 (0.1) | -0.08 (-0.24 to 0.09) | 0.342 |
|  | Repeated measures (N=504) | 0.54 (0.1) | 0.64 (0.1) | -0.10 (-0.26 to 0.06) | 0.219 |
| **Housing stability (housed days)** | |  |  |  |  |
| Over 2 years | Primary analysis on imputed data (n=633)$ | 557 (9.4) | 142 (14.1) | 415 (379 to 452) | **<0.001** |
|  | Complete cases analysis (N=452)µ | 582 (10.8) | 115.4 (19.4) | 466 (422 to 510) | **<0.001** |
|  | Analysis on imputed data using mean data (N=703) | 559 (6.5) | 138 (7.5) | 421 (401 to 441) | **<0.001** |
|  | Analysis on imputed data using “Last observation carried forward” (LOCF) (N=669) | 450 (13) | 115 (11) | 336 (303 to 369) | **<0.001** |
|  | Analysis on imputed data using worse-case scenario (N=669) | 396 (12) | 118 (11) | 278 (245 to 311) | **<0.001** |
| Over 6 months | Repeated measures on imputed data (N=633) | 134 (3.3) | 29.9 (4.3) | 104 (96 to 112) | **<0.001** |
|  | Repeated measures (N=499) | 132 (4.3) | 28.0 (4.8) | 104 (95 to 112) | **<0.001** |

HF: Housing First; TAU: Treatment-as-usual; SE: standard error; 95%CI: 95% Confidence Interval.

For repeated-measures analysis, a linear mixed-effect model was used on either imputed or non-imputed data. The five time points of assessment were coded as 0 (baseline), 1 (6 months), 2 (12 months), 3 (18 months) and 4 (24 months) of the follow-up, in all models where 6 monthly data were available. Treatment difference referenced group differences at the last follow-up point.

£: In the GEE models for count variables based on imputed data, the data set included all randomized individuals at baseline (n=703) minus those who died or withdrawn during the follow-up.

§: In the Complete cases analysis, the data set included all randomized individuals at baseline who completed each time follow-up.

%: In this method, missing values were imputed using the mean of the variable in both groups.

&: In Last observation carried forward imputation, missing data were imputed with the value of the last observed data from the prior follow-up for each participant.

@: In this method, missing values were imputed by assigning the worst possible value of the outcome to dropouts in the HF group and the best possible value in the TAU group.

$: In the mixed models on imputed data for scores/index, the data set included all randomized individuals at baseline (n=703) minus those who withdrawn or died before the first follow-up at M6.

µ: In the GEE models for continuous variables based on 24-month completer’s data, the data set included all randomized individuals at baseline who completed the data on the primary and/or secondary outcomes at the 24-month follow-up.