

Assessment

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Myocardial infarction: Economic, health, and social impacts on informal caregivers

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Objectives. The aim of the study was to measure the economic impact of informal care (IC) on caregivers assisting myocardial infarction (MI) survivors in France. Health and social impacts were also described.

Methods. Data from the prospective 2008 Health and Disabilities Households Survey (*Enquête Handicap-Santé*), carried out among the French general population, were used to obtain information about patients with MI and their informal caregivers. To estimate the approximate monetary value of IC, three methods were used: the proxy good method, opportunity cost method (OCM), and contingent valuation method (CVM). A multivariate analysis was performed to determine the associations of the IC duration and the existence of professional care with the health indicators stated by caregivers.

Results. The analysis included data from 147 caregivers. The mean value of IC ranged from €9,679 per year using the CVM to €11,288 per year using the OCM ($p > .05$). The mean willingness to pay for an additional hour of IC was €10.9 (SD = 8.3). A total of 46.2 percent of caregivers reported that IC negatively affected their physical condition, and 46.3 percent reported that it negatively affected their psychological health. In addition, 40.1 percent declared that caregiving activity made them anxious and 38.8 percent stated they felt alone. Associations were identified between the duration of IC and feeling the need to be replaced, feeling alone and making sacrifices ($p < .05$).

Conclusions. Informal caregiver burden may be recognized in health technology assessment in order not to underestimate the cost of strategies and to facilitate the comparability of cost-effectiveness outcomes between studies.

Long-term care (LTC) expenses have increased over the past few decades (1) and more rapidly than overall healthcare expenditures in most Organisation for Economic Co-operation and Development (OECD) countries with an average growth rate of 4.6 percent per year between 2005 and 2015 (2). According to *l'Institut National de la Statistique et des Etudes Economiques* (INSEE), in 2050, four millions of seniors (aged sixty or older) will be in loss of autonomy in France (3) and it predicted that the number of people aged eighty-five and older will increase by a factor of three (4).

In this context and because of the high cost of formal healthcare services, there is growing evidence that informal care (IC) will play an important role (5;6). IC is defined as care provided by a non-professional caregiver who is not trained to provide care and does not receive monetary compensation (7). Currently, the economic value of unpaid IC in EU member states ranges from 50 to 90 percent of the overall cost of formal LTC provision (8). Previous studies showed that IC can be a substitute of formal home care and nursing home care for elderly population (9) and for population with Alzheimer's disease (10) if the needs are low and require unskilled type of care, IC could be an effective substitute for LTC.

Although IC is unpaid, the time devoted to providing care represents a welfare loss (11) due to caregivers' reduction in working hours or cessation of professional activity, and/or leisure time (12). For instance, reducing working hours results in forgone income for employable caregivers (13). Beyond monetary considerations which represent an objective burden (e.g., tangible currencies such as hours of care provided or tasks performed) (14), IC may generate subjective burden such as emotional burdens, leading to the deterioration of personal relationships and adverse effects on caregivers' physical and mental health (15). In France, a health economic evaluation is requested by the French national evaluation agency named *Haute*

Autorité de Santé (HAS) for market access of medical devices and innovative drugs (16). However, economic studies have often neglected IC (17).

Myocardial infarction (MI) represents the main cause of mortality among coronary heart disease patients in Europe (18) and the incidence of MI is estimated to be approximately 120,000 cases each year in France (19). MI survivors may have difficulties in realizing activities of daily living (ADLs) and instrumental activities of daily living (IADLs), with functional disability and chronic complications in both short and long term (20). With the shift to ambulatory care, demographic changes (21), and the difficulty to access to formal care concerning low socioeconomic status (22), the informal caregiver role will be intensified in the coming years.

Leal et al. (23) shown that cardiovascular diseases represent a major public health problem with an overall annual management cost estimated at €18,973 with an IC cost at €3,420 in France. To our knowledge, no study has assessed the costs and health and social impacts of IC related to MI.

The aim of the current study is to measure the economic impact of IC on caregivers assisting MI survivors in France according to the proxy good method (PGM), the opportunity cost method (OCM), and the contingent valuation method (CVM). The health and social impacts of IC on caregivers are also described.

Data and Methods

Data Sources and Selection

Data were collected from the prospective 2008 Health and Disabilities Household Survey (*Enquête Handicap-Santé*), carried out among the French general population by INSEE and Directorate for Research, Studies, Assessment and Statistics (DREES)—French Ministry of Health in 2008. The first part of this survey, *Handicap-Santé, volet Ménages* (HSM) (24), was conducted among ordinary households and collected sociodemographic and health data from approximately 30,000 participants. The survey examined the consequences of health problems such as functional limitations, care-seeking (professional and IC), occupation, and daily activities. The degree of dependency was reported in the survey according to the Katz index of independence in ADLs (25).

The second part of the survey, *Handicap-Santé, volet Aidants informels* (HSA) (26), was based on telephone or face-to-face interviews with approximately 5,000 informal caregivers of individuals who had completed the HSM. Data collected included information on personal characteristics; occupation; the social environment; the care provided; and the impact of the provided care on family, professional life, and the social environment.

For the current study, MI survivors who completed the HSM survey and who received IC were selected. Care recipients were linked with their caregivers who responded to the HSA survey by a common individual ID: "IDENT_ID" which correspond to the ID of individual in HSM. Only main caregivers were retained (caregiver who provided the longest duration of IC per week). Caregivers who did not state the duration of IC provided were excluded. Data concerning caregiving and the health status of the caregiver were collected in the HSA survey, as were the consequences of IC on social relationships (positive or negative impact on health and social family life). Questions were a closed-ended format and replies were coded into a dichotomous variable ("yes" or "no").

In order to ensure that representativeness of the sample, selected MI survivors were compared with the overall MI survivors, MI survivors who need assistance for ADLs and IADLs, and MI survivors who do not need assistance for ADLs and IADLs. Chi-square tests were performed, except for age and income done with Student's *t* test.

Informal Care Valuation

Stated IC hours were converted into a monetary value using three different monetary valuation methods (27): the PGM, the OCM, and the CVM. The most frequent valuation methods applied in the literature were the PGM and OCM (28). In order to compare with the literature, we used these methods. To take into account more broadly IC impacts on caregivers and because *Handicap-Santé* survey includes a module dedicated to the willingness to pay (WTP), we also used the CVM.

The PGM is a revealed preference method that values IC time at the labor price of a market substitute by applying the market wage rate of a close substitute. Assuming that informal and formal care are perfect substitutes, the wage rate of a professional caregiver may be used to value IC hours (29). We assumed that the minimum hourly wage is near the home care nurse and housekeeper mean wage rate because the qualification level of people working in the home personal services care sector is low (30;31).

The OCM is another revealed preference method that values informal caregivers' forgone benefits due to spending time providing IC (1). When a caregiver devotes time to an assisted person, this time is subtracted from the available time for paid work, housework, or leisure. According to the caregiver's situation in the labor market, IC hours are valued differently: when a caregiver had left his or her job to provide care, the hours of IC were valued using the caregiver's wage rate to take into account the work time lost. Data were not exhaustive concerning the caregiver's occupation classification in the HSA survey, so we used the French mean wage rate by gender in 2008 (32;33). Care time that did not correspond to work time was valued based on the mean hourly wage of a housekeeper (minimum hourly wage in the current study).

The CVM was used to estimate the monetary value per hour of IC from the perspective of the informal caregiver on the basis of stated preferences. The caregiver indicated the maximum amount of money he or she would be willing to pay to be replaced for 1 hour of IC. This information was collected in the HSA survey through the following open question regarding their WTP to be substituted for one additional hour of caregiving:

"Suppose you have the opportunity to be replaced for 1 hour of care in the week. What is the maximum amount would you be willing to pay for this hour of care? Mind that this amount corresponds to a reduction of your budget."

If caregivers had difficulties in answering, they were asked a second question proposing a fixed payment scheme:

"To help you, I am going to show you a table with different values. You could start to remove all amounts of which you are sure do not pay. Then, select all amounts whose you are sure to pay. Last, select the maximum amount would you be willing to pay."

Missing data of WTP were not replaced.

Data Analysis

The data were analyzed descriptively. Continuous variables were compared with Student's *t*-tests and were reported as the means

and standard deviations; categorical variables were reported as proportions. The p values were two-sided, with an α of .05. Logistic regressions were applied to derive unadjusted (Model 1) and adjusted (Model 2) estimates of the associations between the explanatory variables (time of IC and existence of professional care) and the outcomes (health indicators stated by the caregivers). Model 2 was adjusted by caregiver characteristics (age, sex, and cohabitation). The specification of the model is presented in Supplementary Text 1. Odds ratios with 95 percent confidence intervals are presented. A Hosmer–Lemeshow test was conducted for the adjusted model (Model 2) for each health indicator. A model was considered suitable if the p value of the test exceeded 5 percent. To assess the goodness of fit of the models, we estimated the discriminatory power using a receiver operating characteristic curve and by calculating the sensitivity and specificity. Goodness of fit was defined as .7 or higher. All analyses were conducted using SAS Studio V.3.6 for Windows (SAS Institute, Inc., Cary, NC, USA).

The value of IC was estimated as the mean cost per year and per main caregiver with the standard deviation for each method used, and according to the date of MI occurrence (<1-yr vs. \geq 1-yr). When caregivers were asked to state the mean duration of care provided per week, caregivers may have found it difficult distinguishing IC from daily “normal” home activities with additional housework due to the health problems of the care recipients (29); this difficulty would have particularly present when the caregiver lived with the assisted person or when the delivery of IC had started many years previously. Therefore, two estimations of the value of IC were made to avoid overestimation, one in which the stated duration of IC was restricted to 10 hours (“restricted” scenario) and another in which no restriction was imposed (“unrestricted” scenario). We chose a maximum of 10 hours because 91.1 percent of caregivers stated an IC duration equal to or below 10 hours per day. Cost data were presented in 2018 euros (34) using the appropriate consumer price index published by the French National Institute of Statistics and Economic Studies to take into account inflation.

Normally distributed continuous variables were compared by t -test, whereas non-normally distributed data were compared by Wilcoxon’s test.

Results

Sample Characteristics

A total of 798 individuals who had suffered MI who completed the HSM survey were selected (without duplicate data $n = 5$). Among this selection, 574 received IC, including 207 individuals with an informal caregiver who responded to the HSA survey. Only the main caregiver was retained and our final analytical sample included 147 care recipients and their main caregivers (Figure 1). The mean age of the caregivers was 56 years, and the majority were women (72.8 percent). The caregivers were predominantly the partners (43.6 percent) or children (38.1 percent) of the recipient, and more than half lived in cohabitation with the care recipient (57.8 percent). One third were employed (30.6 percent) and the average monthly income of all caregivers was €2,096. They cared for an elderly population (care recipient mean age: 71.6 yr) who had a low level of education (51.7 percent did not have a degree); MI had occurred <1 year before the interview for a third of the care recipients (35.4 percent). According to the Katz index, 27.2 percent of the care recipients and 74.1

percent of those for whom MI had occurred <1 year previously were not able to perform at least one ADL (Table 1). The proportion of sociodemographic characteristics among the care recipients seem to be comparable with those of the overall population of survivors of MI. There were no significant differences ($p > .05$) in age, marital status, educational level, MI occurrence, and able to make <6 ADLs. Significant differences existed in gender, employment, and the use of professional care.

Estimations of Informal Care Impacts

The mean duration of IC provided was 3.0 hours (SD = 4.0) per day. Caregivers who lived with the care recipient provided a mean of 3.8 hours (SD = 4.5) of care versus the 1.9 hours (SD = 2.9) provided by non-cohabitating caregivers ($p < .005$). Caregivers provided a mean of 3.3 hours (SD = 3.8) of care to recipients for whom MI had occurred <1 year before the interview and 2.9 hours (SD = 4.1) to those for whom MI that had occurred \geq 1 year before the interview ($p > .05$). Caregivers provided a mean of 2.8 hours (SD = 3.8) of care to recipients who were not able to realize the six ADLs versus 3.7 hours (SD = 4.5) to those who were not able to realize at least one ADL ($p > .05$) (Table 2).

According to self-assessments of the health and social impacts of caregiving activity, slightly less than half of the caregivers in the sample stated that IC negatively affected their physical condition (46.2 percent) and psychological health (46.3 percent) and made them anxious (40.1 percent); over a third stated that it made them feel alone (38.8 percent). Fourteen percent of caregivers stated that caregiving activity deteriorated their relationships with the care recipients, and 19.7 percent stated that caregiving activity improved their relationships with the care recipients (Table 3). The adjusted analysis (Model 2) indicated that caregivers who provided a high duration of IC had 2.9-fold increased odds of feeling the need to be replaced (p -value = .0524), 1.9-fold increased odds of making sacrifices (p -value = .0523), and 2.1-fold increased odds of feeling alone (p -value = .0543) than caregivers who provided a low duration of IC. When professional care was used, caregivers had .5-fold decreased odds of feeling alone (p -value < .01), .6-fold decreased odds of making sacrifices (p -value = .0523) and .8-fold decreased odds of feeling the need to be replaced (p -value < .01) compared with care recipients who did not receive professional care. According to the Hosmer–Lemeshow test and the area under the curve (AUC), all the adjusted models fit the data well ($p > .05$; AUC > .7) (Supplementary Table 1).

Economic Valuation of Informal Care

The mean number of IC hours was estimated to be 1,108 per year; per caregiver, this number was estimated to be 1,187 hours for caregivers of recipients with MI occurrence <1 year before the interview, and 1,068 hours for caregivers of recipients with MI occurrence \geq 1 year before the interview. Supplementary Table 2 presents the mean value of IC according to the different methods of estimation and stratified according to date of MI occurrence. The mean value of the hours of informal caregiving ranged from €9,679 per caregiver using the CVM to €11,288 using the OCM ($p > .05$). For recipients with MI occurrence <1 year before the interview, the mean value ranged from €11,727 using the PGM to €12,089 using the CVM (no significant differences, $p > .05$); for recipients with MI occurrence \geq 1 year before the interview, the mean value this ranged from €8,689 using the

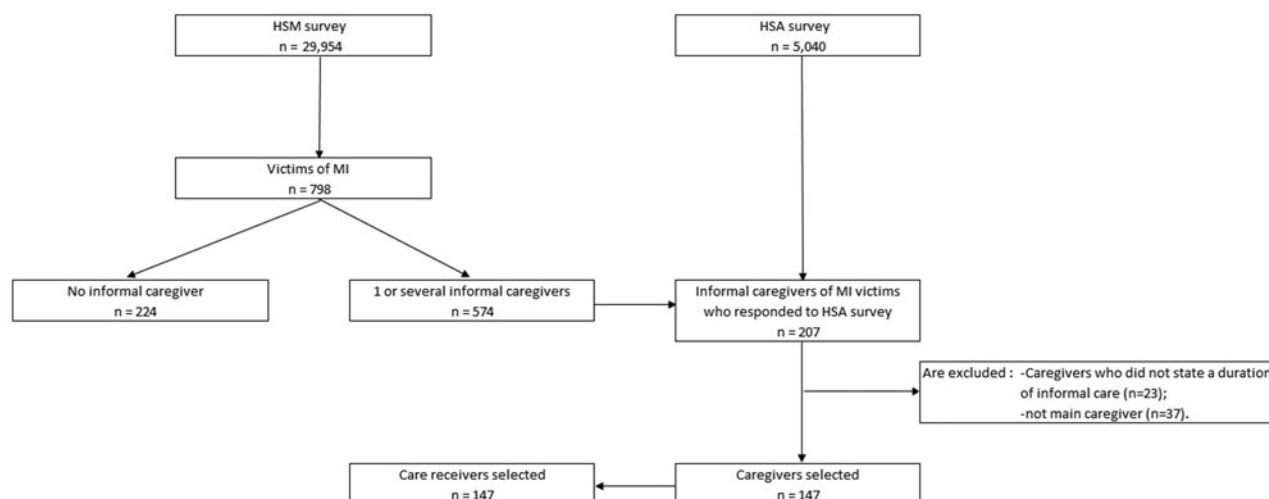


Fig. 1. Flow chart of the selection of informal caregivers for MI survivors from the *Handicap-Santé* survey (2008). HSM, *Handicap-Santé, volet Ménages*; HSA, *Handicap-Santé, volet Aidants*; MI, myocardial infarction.

Note: The HSM survey was conducted among ordinary households with a total of 29,932 individuals, of whom 798 individuals had survived MI. Among those who had experienced MI, 574 individuals reported receiving care from at least one informal caregiver and provided the names of their informal caregivers so they could be interviewed as part of the HSA survey. A total of 207 informal caregivers of patients with MI responded to the HSA survey. Caregivers who did not state a duration of IC were excluded ($n = 23$). Then, only the main caregivers of care recipients were retained.

Table 1. Characteristics of the selected care recipients, their selected main caregivers and MI survivors (%)

	Care recipients selected ($n = 147$) (1)	Main caregivers selected ($n = 147$)	MI survivors ($n = 798$) (2)	MI survivors who need assistance in ADLs or/and IADLs ($n = 366$)	MI survivors who do not need assistance in ADLs and IADLs ($n = 432$)	p value (1)(2)
Age (mean[\pm SD])	71.6 (\pm 14.1)	56.3 (\pm 15.4)	69.0	74.0	64.7	
Female	42.2	72.8	31.6	49.7	16.4	*
Married/partnered	60.6	87.8	66.0	51.9	78.2	
Cohabitation with care recipient	-	57.8	-	-	-	
Educational level						
Primary school incomplete	51.7	23.1	51.2	41.3	55.8	
Primary or equivalent	32.6	17.7	34.7	46.9	27.7	
Secondary school	10.9	45.6	8.6	7.4	9.6	
University degree or equivalent	4.8	13.6	5.5	4.4	6.9	
Employed	1.9	30.6	12.0	1.6	22.0	*
Income (mean[\pm SD])	2,006.3 (\pm 1,343.8)	2,096.3 (\pm 1,260.4)	2,124.2	1,808.7	2,388.5	*
MI occurrence <1 year	35.4	-	31.3	61.7	4.4	
Able to perform <6 ADLs ^a	27.2	-	25.1	-	-	
Need assistance with ADLs and IADLs	76.9	-	54.3	-	-	*
Use of professional care	55.1	-	23.8	51.9	.0	*
Relationship with care recipient						
Partner	-	43.6	-	-	-	
Father/mother	-	2.0	-	-	-	
Brother/sister	-	4.8	-	-	-	
Children	-	38.1	-	-	-	
Other family member	-	6.1	-	-	-	
Friend	-	5.4	-	-	-	

^aAccording to the Katz index. 74.1 percent of care recipients with MI occurrence <1 year.

* p value <.05; all statistics were performed with Chi-square test, except for age and income done with Student's t test.

Table 2. Daily duration in hours of IC provided depending on care recipient and informal caregiver characteristics ($n = 147$)

Characteristics	Mean (\pm SD)	p value
MI occurrence		
<1 year	3.3 (\pm 3.8)	>.05
>1 year	2.9 (\pm 4.1)	
ADL performance		
Able to perform all ADLs	2.8 (\pm 3.8)	>.05
Not able to perform at least 1 ADLs	3.7 (\pm 4.5)	
Caregiver work status		
Employed	2.1 (\pm 3.2)	<.05
Unemployed	3.5 (\pm 4.2)	
Cohabitation with caregiver		
Cohabiting	3.8 (\pm 4.5)	<.005
Non-cohabitating	1.9 (\pm 2.9)	
Total	3.0 (\pm 4.0)	

SD, standard deviation; MI, myocardial infarction; ADLs, activities of daily living. Duration in hours of IC is a discrete variable, all statistics were performed with Chi-square test.

CVM to €10,939 using the OCM ($p > .05$). The caregivers' mean WTP for an hour of IC was €10.9 (SD = 8.3); the mean WTP was €11.3 (SD = 5.9) for caregivers of recipients with MI that occurred <1 year before the interview, and €10.8 (SD = 6.3) for recipients with MI occurrence ≥ 1 year before the interview ($p > .05$). Almost half of the caregivers did not state a WTP value (41.0 percent) because they refused to do so or could not estimate the value. There were twenty-five protest answers: eight caregivers refused to state a WTP value, and among the twenty WTP values equal to 0 provided by caregivers, twenty-seven were considered protest answers. For these latter protest answers, the comments made by the caregivers included "it is my duty," "I want to do it," and "it never crossed my mind."

An additional estimate (Supplementary Table 3) shown that the mean annual value of IC ranged from €11,391 using the CVM to €13,797 using the PGM per cohabitant caregiver (significant differences, $p < .05$). For non-cohabitant caregiver, this ranged from €7,029 using the PGM to €7,834 using the OCM ($p < .05$).

Discussion

The current study found that IC for acute disease represents an important economic impact, as has been reported for IC for chronic diseases (10;35). The IC cost estimated suggests that IC should be more prominently included in economic evaluations. A French study (36) estimated the costs of healthcare resource consumption at €18,855 in the year following an MI from a societal perspective, but IC costs were not included. Even without the use of the same sample, including our estimate, IC may represent approximately 60 percent of the management costs of MI. Furthermore, there was also a negative impact on the health of caregivers as well as their relationships with friends and family, but notably, caregiving also had positive impacts on caregiver-recipient relationships. Multivariate regressions indicated that the duration of IC provided by caregivers and an absence of

Table 3. Caregiver self-assessments of the health and social impacts of caregiving ($n = 147$)

	%
Health impacts	
Health status	
Very good and good	51.7
Quite poor, poor, and very poor	48.3
IC negatively affects or leads to...	
Health	24.5
Physical condition	46.2
Psychological health	46.3
Depression	14.3
Overwork/anxiety	40.1
Making sacrifices	36.7
Feeling alone	38.8
Feeling the need to be replaced	23.8
Social impacts and family life	
IC negatively impacts the relationship with...	
Care recipient	13.6
Family member(s)	21.1
Friend(s)	11.6
IC impacts positively on relationship with...	
Care recipient	19.7
Family member(s)	14.3
Friend(s)	1.4

professional care may negatively impact the health and social activity of caregivers.

The *Handicap-Santé* survey is a prospective survey carried out in the French general population and there is no significant difference concerning characteristics sociodemographic in accordance to the proportions between care recipients selected and the overall population of survivors of MI. However, IC cost may vary according to the valuation method used and country peculiarities (family traditions, LTC system characteristics, and levels of income per capita). It may induce differences in the use and intensity of formal care and IC. Shadow prices used in the valuation method of IC are impacted by level of incomes and by the social consideration which do not facilitate comparison of IC costs between countries.

Although the three valuation methods were based on different shadow prices, overall cost estimations did not vary significantly. This finding is not surprising for the PGM and OCM. The PGM shadow price is the minimum wage rate, which is also used in the OCM for those who do not work, which represents more than two thirds of caregivers. Furthermore, any time spent caregiving over 35 hours is priced at the minimum wage. Therefore, the large proportion of caregivers who were unemployed can explain the similar overall costs. The CVM, however, captures the preference heterogeneity of caregivers who state a WTP value according to the care duration as well as the type of care provided. The CVM value depends on the caregiver characteristics and care-recipient

disease and the overall cost may have been different according to the PGM and OCM estimations for other types of care recipients. For instance, the mean WTP values for those suffering from a disease that causes more disability such as Alzheimer's disease, have been reported to be higher than the mean WTP values that were reported here (37).

There is no consensus as to the best method for the valuation of IC (7). In many cases, the choice of method depends largely on the data available. However, each method has limitations. The WTP approach covers widely costs and effects of IC but to obtain a WTP value from caregivers may be difficult. Stating a monetary value of providing care to a loved one can be annoying or deemed unethical for caregivers and may lead to protest replies, as illustrated by a WTP of zero or a refusal to answer. The PGM and OCM are easier to use, as they require less data. However, PGM values IC by the hourly rate of a professional caregiver (22), which assumes that informal and formal care are perfect substitutes is a strong one (38), implying that there are no differences in efficiency and quality, and that needs are fully satisfied (10). The OCM has a limitation with retired persons because IC is valued according to the occupation status of caregivers and to the mean wage rate in France. The PGM and OCM do not cover the full costs and effects of IC. To combine PGM or OCM with other measurement methods of health-related quality of life in informal caregiving is recommended to capture more broadly costs and effects of IC. It is necessary to identify the main impacts of IC to set up an appropriate intervention in terms of public policies. Previous studies used preference-based caregiver outcome instruments such as the care-related quality of life (CarerQol) (39) allowing measuring care-related quality of life of informal caregivers. Integration of this instrument in economic evaluations would allow capturing caregiving experience aspects such as positive impact of caregiving or relationships effects of caregiving.

Health and social impacts on informal caregivers are also briefly described from the available statement data in *Handicap-Santé* survey and according to the multivariate analysis, associations were identified with the duration of IC and the existence of professional care. These results highlight that caregivers should have access to counseling such as training, peer support, and home respite. Caregiving is often described in terms of burden, but positive impacts can also exist. Future research should better integrate to represent the true caregiving experience. Several studies have found that providing care or assistance to another person can be associated with a sense of satisfaction, psychological well-being (40). Unfortunately, limited data are available on the positive impacts of IC from the *Handicap-Santé* survey.

Health technology assessment (HTA), including health economic evaluations, is useful for decision makers particularly for pricing negotiation and reimbursement of health product. Krol et al. (11) recalculated the incremental cost-effectiveness ratios (ICERs) from studies including IC and they showed that the inclusion of IC may have an impact of the costs and effects of informal caregiving on cost-effectiveness outcomes and may even exceed medical costs. In a study about Alzheimer's disease, the ICER increased from €26,000 to €59,000 after excluding IC costs (41). However, despite guidelines, informal caregiver burden is not routinely considered in HTA.

Some limitations of the study should be noted. The *Handicap-Santé* survey dates back to 2008 but it represents the unique database providing IC duration and WTP data in MI in

France. With the ambulatory care and demographic changes, the need for home care increased and IC holds an important role to fill the welfare state gap (21). Hence, our results may underestimate IC burden.

Concerning the IC valuation, with the contingent valuation, caregivers were asked to indicate their WTP for 1 hour of IC but there was no distinction between care activities. Specific questions about the WTP for ADL and IADL tasks may have led to varied responses, as illustrated in a Dutch study that found that informal caregivers of individuals with rheumatoid arthritis preferred to assist with house work tasks rather than personal care or organizational tasks (27). With the OCM, individual labor income was not used because it was not systematically recorded in the *Handicap-Santé* survey. Thus, the economic values of IC estimated with PGM and OCM are close.

Last, declared data about health and social impacts of IC were dichotomous without graduated scale in the current study. The use of CarerQol instrument could be a solution to link quality of life with the costs estimated but it was not collected in the *Handicap-Santé* survey.

Colombo et al. (42) showed that caregiving activity is associated with a higher risk of poverty. Professional activity is essential to maintain a social life and reduce health impact of IC on caregiver life. Arrangements are possible to reconcile IC and professional activity: promote flexible work arrangement, training or economic incentives to reduce work time for caring, and so on (5;42). Psychological support can also reduce the impact of IC on the caregiver's health (5). Development of respite care could be a way to maintain leisure activities or free time (42). The access and availability of formal care is also crucial because it allows caregiver to adjust the intensity and the amount of caregiving provided. Our study highlight the need to focus public policies on professional activity and health of caregivers. WTP value provides an estimate of the value of IC provided based on caregiver appreciation that may be useful to decision makers. Policymakers need data in terms of determining factors of the use of care and costs to conceive measures aimed at strengthening caregiver resilience and putting support to ensure that enables them to continue to care. For example, it could be used to set the amount of financial compensation as a way to motivate caregivers to continue providing care (43). With the shift to ambulatory care and the increasing number of the elderly, IC will be a substantial contributors to LTC. Caregiver quality of life does not need to be excluded from economic evaluations of health technologies and should be taken into account alongside patient quality of life. Informal caregiver burden may be recognized in HTA in order not to underestimate cost of evaluated strategies and to facilitate the comparability of cost-effectiveness outcomes between studies.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S0266462320000148>

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Conflict of Interest. The authors declare that there are no conflicts of interest.

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