Digital Charitable Medical Assistance: Characteristics, Dilemmas, and Optimal Allocation of Funds

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Abstract

The "unclear baseline" regarding the total volume and effectiveness of digital charitable medical assistance resources interferes with government administrative decision-making. In the process of charity promoting common prosperity, the value evaluation of allocating scarce charitable resources to financially disadvantaged patients for medical burden reduction still lacks a micro-level foundation. Using the national standard "GB/T14396-2016 Disease Classification and Codes" and a binary logistic regression model, this study investigates the characteristics, dilemmas, and optimal allocation of digital charitable funds for medical assistance. The findings indicate that: the overall completion rate of fundraising targets is less than 30%; the long-tail effect regulated by the scattered donation mechanism is not particularly significant; assistance value demonstrates notable variation across disease categories; project occurrence probabilities exhibit marked differentiation; and the assistance value for catastrophic diseases lacks universal applicability across disease categories. Under the premise that public trust capital signals from fundraising entities and network platforms are effectively recognized by society, assistance value is positively correlated with the recognized effectiveness of network fundraising channels. The primary contributions of this paper lie in exploring the transition from "good governance" to "regulatory governance" , the shift from "disease fundraising performance" to "medical expense payment" , constructing a benefit evaluation mechanism centered on "social value creation" , and proposing ideas and strategies for the optimal allocation of charitable funds for medical assistance empowered by blockchain and the metaverse, thereby contributing novel insights to research on social governance innovation that leverages the institutional advantage of "concentrating resources to accomplish major undertakings" . This paper has limitations regarding the valuation of online medical services and the elucidation of intrinsic mechanisms underlying the empowerment of charitable medical assistance application scenarios by emerging technological productive forces.

Full Text

Digital Charity Medical Assistance: Characteristics, Dilemmas, and Optimal Allocation of Donations—A Study Based on 5,542 Online Fundraising Projects for Serious Illnesses

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Abstract: The lack of clarity regarding the total volume and effectiveness of digital charity medical assistance resources interferes with government administrative decision-making. In the process of charity contributing to common prosperity, the evaluation of the value of scarce charitable resources in alleviating medical burdens for financially disadvantaged patients still lacks a microfoundation. Using the national standard *GB/T14396-2016 Classification and Codes of Diseases* and a binary logistic regression model, this study examines the characteristics, dilemmas, and optimal allocation of digital charitable funds for medical assistance. The findings indicate that the overall completion rate of fundraising targets is less than 30%, the long-tail effect regulated by the sporadic donation mechanism is not particularly significant, there are obvious disease-category differences in assistance value, project occurrence probabilities vary markedly, and the assistance value for serious and critical illnesses lacks universal applicability across disease categories. On the premise that public trust capital signals from fundraising entities and online platforms are effectively recognized by society, assistance value is positively correlated with the recognition of online fundraising channel effectiveness. The main contributions of this paper are to explore the transition from "good governance" to "regulatory governance," from "disease fundraising performance" to "medical expense payment," to construct a benefit evaluation mechanism centered on "social value creation," and to propose ideas and countermeasures for optimizing the allocation of charitable funds through blockchain and metaverse empowerment, thereby contributing new content to research on social governance innovation based on leveraging the institutional advantage of "concentrating resources to accomplish major tasks." This paper has shortcomings in terms of discounting the value of online medical services and revealing the internal mechanisms of application scenarios where emerging technological productivity empowers digital charity medical assistance.

Keywords: charity; medical assistance; online fundraising; personal assistance seeking

Digital charity medical assistance refers to charitable activities where charitable entities use digital technology, data elements, and network infrastructure to provide donations or services to patients from financially disadvantaged families. It includes online charitable fundraising, digital construction of charitable

organizations, charitable data security services, blockchain-enabled charitable fund supervision, and metaverse charitable application scenarios. In 2021, online fundraising exceeded 10 billion yuan for the first time (excluding personal serious illness assistance and online medical mutual aid), representing a year-on-year increase of 52%, with over 10 billion participation donations [1]. Since the state has not yet established a special statistical system for digital charity medical assistance data or a system for publishing assistance effectiveness, the annual China Charity Ranking has not set up a special section for digital charity medical assistance, and the national charitable information disclosure platform built by the Ministry of Civil Affairs has not established a charitable medical assistance section. Consequently, we are not entirely clear about how much funding each disease category can receive or how significant a role digital charity medical assistance actually plays in poverty alleviation for patient families. Therefore, studying the social value of digital charity medical assistance is important for improving the theoretical system of digital charity medical assistance and for promoting the integrated development of digital charity medical assistance, poverty alleviation, and common prosperity.

In recent years, academic circles have mainly discussed digital charitable donation motivations and willingness [2][3][4][5], digital charitable fundraising program design and persuasion effectiveness [6][7][8], information forwarding and diffusion effects of digital charitable fundraising [9][10][11], digital charitable trust crisis and collaborative governance [12][13][14], and digital charitable fundraising performance [15][16][17][18]. However, there remain some neglected issues in the basic theory, regulations, policies, and empirical research on digital charity medical assistance.

For example, academic circles have not yet paid sufficient attention to the estimation of social value in digital charity medical assistance. How much economic burden can digital charity medical assistance alleviate for patients with different diseases? The *GB/T14396-2016* standard classifies more than 5,000 types of tumor diseases into 18 categories. What is the probability of receiving donations for each disease category? Additionally, the state has not yet established a statistical system for digital charity medical assistance resources or a system for publishing assistance effectiveness. Digital charity medical assistance resources face prominent issues such as non-standard statistical scope and methods, unclear total volume, and unclear baseline data, and the establishment of regulations and systems still lacks theoretical support. Furthermore, some charitable organizations have signed false agreements with medical institutions, causing many donations to "mysteriously disappear." Such issues reduce the precision of government decision-making. This paper collected 5,442 completed charitable organization fundraising samples from the Tencent Public Welfare Foundation' s Lejuan platform between 2012 and 2021 (including 631 samples of personal serious illness assistance seekers who legally raised funds through charitable organizations). The samples cover 988 charitable organizations across 31 provinces in mainland China. Using the national standard *GB/T14396-2016*, disease classifications were determined, and the current status, characteristics, dilemmas,

and optimal allocation of charitable assistance for 141 disease categories among the 264 disease classifications specified in the standard were analyzed.

2.1 Indicator Selection and Variable Setting

According to *GB/T14396-2016*, the disease corresponding to each of the 5,442 sample projects was identified and classified into 141 disease categories, establishing 141 secondary indicators. "Fundraising target completion status" was set as the dependent variable, with the variable type defined as a binary variable. A fundraising target completion ratio $ $100% indicates completion, while a ratio <100% indicates non-completion. The fundraising target completion ratio = (amount raised ÷ fundraising target) × 100%. The aforementioned 141 disease categories were set as independent variables, while drawing on the disease-category fundraising project indicator system designed by the Lejuan platform, 26 additional non-disease independent variables were established. The disease-category independent variables and non-disease independent variables totaled 166. Fundraising targets, amounts raised, number of donors, fundraising target completion ratios, and fundraising cycles were set as interval variables, while the remaining 20 independent variables were set as binary variables (see Appendix Table 1 and Appendix Table 2). A binary logistic regression model was employed for analysis.

2.2 Main Characteristics of Digital Charity Medical Assistance

(1) Fundraising Target Completion Rates Are Not Particularly High. Analysis of sample data reveals that the total fundraising target for the 5,442 projects was 1.108 billion yuan, with actual funds raised amounting to 285 million yuan, accounting for 25.7%. Specifically, 37.6% of projects raised less than 10,000 yuan, 37.8% raised between 11,000 and 50,000 yuan, 11.1% raised between 51,000 and 100,000 yuan, and 13.5% raised more than 100,000 yuan. Projects raising less than 50,000 yuan accounted for 75% of the total. The long-tail effect is not particularly significant. Among the 141 disease categories, 10 disease categories had projects that either did not specify fundraising targets or did not raise any funds.

(2) Medical Expense Burden Reduction Ratios Are Relatively Low. The medical expense burden reduction ratio indicator was used to examine the assistance value of the remaining 131 disease categories. Since some charitable organizations extract management fees ranging from 1.7% to 10%, with the majority extracting between 3% and 10%, three burden reduction ratio indicators were designed (see Appendix Table 3): a ratio with no management fee extraction (burden reduction ratio = (amount raised ÷ fundraising target) × 100%), a ratio with 5% management fee extraction (burden reduction ratio = [amount raised × (1-5%)] ÷ fundraising target × 100%), and a ratio with 10% management fee extraction (burden reduction ratio = [amount raised × (1-10%)] ÷

fundraising target × 100%).

Overall, disease categories with burden reduction ratios exceeding 50% account for 21%–23% of the total, those with ratios between 30% and 50% account for 21%–26%, and those with ratios exceeding 30% account for 42%–49%. This indicates that while charitable resources have alleviated the economic burden on medical assistance recipients to some extent, the funding gap remains substantial.

(3) Donations Are Mainly Used for Major Tumor Diseases. Among the 20 major disease categories, tumor-related projects raised 146 million yuan, accounting for 51.4% and ranking first. The four categories of "Diseases of the Blood and Blood-Forming Organs and Certain Disorders Involving the Immune Mechanism," "Congenital Malformations, Deformations, and Chromosomal Abnormalities," "Injury, Poisoning, and Certain Other Consequences of External Causes," and "Diseases of the Respiratory System" followed in sequence, with fundraising amounts mainly between 10 and 24 million yuan, totaling 70 million yuan and accounting for 24.6%. The five categories of "External Causes of Morbidity and Mortality," "Diseases of the Nervous System," "Certain Conditions Originating in the Perinatal Period," "Diseases of the Genitourinary System," and "Diseases of the Musculoskeletal System and Connective Tissue" raised a combined total of 39 million yuan, accounting for 13.7%. The remaining 10 major disease category projects raised less than 5 million yuan, totaling 29 million yuan and accounting for 10.2%. In terms of average fundraising amounts per disease category, the ranking changed little from the total amount ranking, with the tumor category still ranking first. Among the bottom 10 disease categories in fundraising amount, 9 remained in the bottom 10 in average amount ranking (Table 1).

(4) High Concentration of Assistance Value. The concentration of assistance value was identified using the probability of fundraising project occurrence. First, disease categories were screened. Among the 141 disease categories, only 28 categories with a total sample size $ 30 $ were included in the binary logistic regression model. Multicollinearity among the 28 disease-category independent variables and 24 influencing-factor independent variables was tested, revealing 13 independ $ 0.1 $ and variance inflation factor $ VIF > 10 $, indicating multicollinearity among independent variables. After mu $ 0.1 $ and $ VIF < 10 $ were achieved, with no multicollinearity among independent variables. The 28 disease categories factor independent variables that passed the multicollinearity test were included in the binary regression model for $ of - fit R^{2} $ = 0.6, indicating a high degree of fit, with an overall prediction success rate of 91%. The test results are shown in Table 2.

Second, fundraising project occurrence probabilities were calculated. Children' s projects had the highest occurrence probability. Projects for "Other Disorders of the Ear," "Influenza and Pneumonia," and "Other Congenital Malformations of the Digestive System" primarily targeted children. For example, "Other Disorders of the Ear" addresses childhood deafness, and "Influenza and Pneumonia" addresses childhood pneumonia. The occurrence probabilities for these three disease categories were 71.63%, 79.37%, and 72.17%, respectively. Diseases such as

leukemia, congenital heart disease, severe thalassemia, lymphoma, cleft lip and palate, and rare diseases had relatively high probabilities of receiving assistance.

Emergency projects had relatively high occurrence probabilities, nearly 70%. The occurrence probability for the disease category "Burns and Corrosions Involving Multiple Body Regions and Unspecified Sites" was 67.96%, exceeding that of malignant tumor projects. Tumor project occurrence probabilities were not particularly high, at approximately 20%. Among seven tumor-related projects, six failed the test. The occurrence probability for the category "Malignant Neoplasms of the Eye, Brain, and Other Parts of the Central Nervous System," which passed the test, was 20.97%, only higher than the 27.51% probability for the category "Cerebral Palsy and Other Paralytic Syndromes." Blood disease project occurrence probabilities were also not high, at approximately 30%. Among four blood disease projects, three failed the test. The occurrence probability for the category "Hemolytic Anemia," which passed the test, was 29.57%. Additionally, 21 disease categories failed the model test, accounting for 75%.

Overall, the value of digital charity medical assistance is highly concentrated. As previously analyzed, among the 20 major disease categories, the tumor category had the highest fundraising amount. Why, then, is the occurrence probability of malignant tumor projects in disease categories not particularly high? Analysis of the total and average fundraising amounts for the 141 disease categories reveals that among the 17 tumor disease categories examined, except for "Malignant Neoplasms of Lymphoid, Hematopoietic, and Related Tissue" and "Malignant Neoplasms of the Eye, Brain, and Other Parts of the Central Nervous System," the other 15 tumor project categories did not rank high in either total or average fundraising amounts. This indicates that donations are mainly concentrated in a very small number of malignant tumor projects, such as the "Malignant Neoplasms of Independent (Primary) Multiple Sites" category within the tumor major category, with limited assistance effectiveness for most malignant tumor projects. The situation is similar for blood disease projects, which ranked second in fundraising amount.

This characteristic of donations being mainly used for malignant tumor diseases and blood diseases has certain global universality. Relevant research results on female malignant tumor diseases in the UK [19], complex and chronic diseases in the US [20], and rare diseases in Colombia [21] all validate this characteristic. Jordan T. Holler (2023) studied the effectiveness of digital charity medical assistance for prostate cancer, breast cancer, bladder cancer, kidney cancer, cervical cancer, uterine cancer, ovarian cancer, testicular cancer, oral cancer, and thyroid cancer patients in the US and found that the average fundraising amount concentration for most malignant tumor diseases was relatively high [22]. The main reason for high fundraising amounts for difficult-to-treat malignant tumor diseases and high-mortality blood diseases is that they are more likely to generate empathy among potential donors [23], including international medical tourism charitable fundraising for malignant tumor diseases [24].

3 Dilemmas of Digital Charity Medical Assistance

Digital charity medical assistance faces numerous limitations. A broad consensus is the insufficient credibility of charities. The Standing Committee of the National People' s Congress Law Enforcement Inspection Team' s inspection report on the implementation of the *Charity Law* found: "In 2018 and 2019, China' s economy achieved high-quality development with GDP maintaining steady growth, yet the total amount of charitable donations stagnated, and the weak credibility of charitable organizations was one of the important factors"[25]. In addition, digital charity medical assistance faces the following limitations.

3.1 Low Social Recognition of Online Fundraising Channels

Is the overall low completion rate of digital charity medical assistance project fundraising due to the public not supporting such projects or not recognizing online fundraising channels? This is discussed from four perspectives. First, the fundraising target completion rate of professional medical assistance platforms. Different research teams, including Jiang Zhiqiang, Cheng Cheng, and Wang Mengning, collected samples from well-known serious illness crowdfunding platforms in China and found that the overall completion rate was also not high, with the lowest at approximately 4% and the highest at approximately 27%. Second, the overall fundraising completion rate of medical assistance projects on comprehensive platforms. Li Guowu' s research based on samples from the Tencent Public Welfare platform found an overall fundraising completion rate of approximately 30%. Third, the overall fundraising completion rate of commercial crowdfunding projects. The completion rate for such projects varies significantly, with lower rates below 10% and higher rates not exceeding 50%. Fourth, the overall completion rate of online platforms. The overall success rate of commercial crowdfunding projects on well-known US crowdfunding platforms Kickstarter and Indiegogo is approximately 44.7% and 17.1%, respectively. The overall success rate of projects on Tencent Public Welfare platform and Zhongchou.com is approximately 29.9% and 25.2%, respectively (Jiang Zhiqiang). Since 2017, our team has collected samples of charitable medical assistance, charitable education assistance, charitable poverty alleviation assistance, animal protection, and environmental protection projects from two well-known comprehensive public welfare platforms, Tencent Lejuan and Alipay, and found that the overall fundraising target completion rate for various projects ranges between 26% and 47%. An overview of representative domestic and international academic research is shown in Table 3.

In summary, the overall fundraising success rates for public welfare projects, charitable projects, and commercial projects are not particularly high, and the overall fundraising success rates of online platforms themselves are also not high. Insufficient social recognition of online fundraising channel effectiveness constrains the overall fundraising completion rate. The Standing Committee of the National People' s Congress Law Enforcement Inspection Team' s inspection report on the implementation of the *Charity Law* found: "Internet

public fundraising information platforms have stricter requirements for charitable project execution costs and management fees than laws and regulations, limiting fundraising channels; some internet platforms charge excessive commission fees, affecting actual fundraising effectiveness" (Zhang Chunxian, 2020). In short, the limitations of online fundraising channels and the poor online fundraising environment constrain the enhancement of digital charity medical assistance value.

3.2 Weak Research on Key Basic Theoretical Issues

Since the 18th National Congress of the Communist Party of China, research on key basic theories related to digital charity medical assistance has been somewhat thin. From 2014 to 2017, China intensively implemented charitable laws, regulations, and normative documents such as the *Interim Measures for Social Assistance* and the *Charity Law*. Academic circles discussed core issues such as "charity participation" in the "8+1" social assistance framework and online platform regulation in the *Charity Law* [37][38]. However, neither the *Interim Measures for Social Assistance* nor the *Charity Law* contains special provisions for charitable medical assistance, and key basic theoretical research has not achieved breakthrough progress. After the "Luo Er" incident, academic circles intensively discussed the regulation of online personal serious illness assistance fraud and whether it should be included in the regulatory scope of the *Charity Law*, with discussions and controversies continuing until the state included it in the appendix of the *Charity Law (Revised Draft)* at the end of 2022 [39]. After the 2023 National "Two Sessions," academic circles began to pay attention to charitable medical assistance, with the China Social Security Society jointly launching charitable medical assistance case development with charitable organizations, research institutes, and the Ministry of Civil Affairs. Very few scholars, such as Wang Haiyi (2023), have conducted theoretical research on digital charity medical assistance [40]. However, there are few landmark achievements in academic circles, and there is still a long way to go from theoretical output to content incorporation into law.

Eight years after the promulgation and implementation of the *Charity Law*, key theoretical issues such as the unclear attributes of online fundraising platforms (Jin Jinping, 2017) [41], unclear qualification of personal serious illness assistance seekers and lagging regulatory measures [42], and unclear attributes of online charitable fundraising rights [43] have not achieved breakthrough progress. Key issues such as how to build an emergency charitable medical assistance mechanism catalyzed by the COVID-19 pandemic, how to design a fundraising platform exit mechanism, and how to govern misleading self-media publicity remain under academic discussion. How emerging technologies and new business forms such as blockchain, artificial intelligence, metaverse, and the Internet of Things can enhance the effectiveness of digital charity medical assistance still lacks theoretical support. Issues such as how to discount the value of online charitable services, how to establish a data statistics and assistance effectiveness online

publishing system, and how to improve the participation of Generation Z in digital charity medical assistance all lack necessary basic theoretical research. Additionally, the following two sets of data reflect the weakness of basic theoretical research. From 1999 to 2022, the National Social Science Fund funded a total of 103 charity-related projects, of which 6 were on "Internet + Charity" topics, accounting for 5.8%, but none of the research themes focused on charitable medical assistance. As of August 20, 2023, the "Charity and Public Welfare" section of the China Social Security Society' s official website republished 178 high-quality academic papers on charity, of which 11 were on personal serious illness assistance, online fundraising platforms, and charitable digitalization, accounting for 6.1%; there were 0 papers on charitable medical assistance fundraising.

3.3 Significant Substitution and Regulatory Effects of Laws and Regulations on Social Mechanisms

China' s charity sector follows the principle of autonomous and voluntary development in accordance with laws and regulations, emphasizing the regulatory role of social mechanisms. Since 2014, the state has implemented laws, regulations, and management systems such as the *Interim Measures for Social Assistance*, the *Charity Law*, the *Measures for the Administration of Public Fundraising by Charitable Organizations*, the *Notice of the General Office of the Ministry of Civil Affairs on Strengthening the Supervision of Charitable Medical Assistance Activities*, the *Notice on the Selection of Internet Public Fundraising Information Platforms for Charitable Organizations*, the *Basic Technical Specifications for Internet Public Fundraising Information Platforms of Charitable Organizations*, and the *Basic Management Specifications for Internet Public Fundraising Information Platforms of Charitable Organizations*. The impact of these laws, regulations, and policy measures has been somewhat too strong, causing large fluctuations in online fundraising amounts. For example, the annual growth rate peak-to-valley differences for online fundraising amounts between 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, and 2020-2021 were 188.6%, 359.3%, 544.5%, 45.4%, 39.9%, 686.2%, 612.5%, and 2.18%, respectively.

To verify whether these laws, regulations, and systems impacted the stability of fundraising amounts, variables that passed the test in Table 2 were used. Due to model constraint limitations, dummy variables for the legal and regulatory system were added for the years 2014, 2015, 2016, 2017, 2018, and 2019 as turning points for binary logistic model testing (test results are shown in Table 4). The criterion was: if the regression coefficient of a dummy variable for a certain year was positive and significantly increased compared with the previous year, the system was determined to have a significant impact on fundraising amounts that year; otherwise, the opposite was true. The regression results show that the dummy variables for all six years passed the test ($P = 0.00 < 0.05$, Nagelkerke $R^2 > 0.41$), with regression coefficients of 0.643, 1.408, 0.965,

-0.686, -2.84, and -3.06, respectively. The dummy variable regression coefficients for 2014-2016 were all positive, indicating a significant impact on fundraising amounts, especially with a larger regression coefficient in 2015. The dummy variable regression coefficients for 2017-2019 were all negative, indicating an increasingly insignificant impact on fundraising amounts that weakened year by year. Relative to other years, the construction of laws, regulations, and systems between 2015-2016 had a more obvious impact on online fundraising amount fluctuations. Although the peak-to-valley differences in annual growth rates for online fundraising amounts in 2018-2019 and 2019-2020 were large, whether the fluctuations were mainly impacted by laws, regulations, and policy measures or by other factors requires further testing.

The impact of emerging technological productivity such as big data, artificial intelligence, the Internet of Things, cloud computing, and blockchain on charity development is increasing. However, the overall digitalization process of the charity industry is developing slowly, charitable organizations invest little, the digital foundation is weak, and imperfect laws and regulations are prominent issues that are difficult to effectively resolve in the short term [43]. Typical cases and application scenario development for emerging technological productivity such as blockchain, artificial intelligence, and metaverse to assist digital charity medical assistance lack institutional guidance and regulation. Article 104 only stipulates in principle that emerging technological means such as "big data, cloud computing, and blockchain" empower charity development. The *Social Assistance Law (Draft for Comments)* published by the Ministry of Civil Affairs and the Ministry of Finance in September 2020 stipulates "charity" participation in social assistance activities in Article 56, and the *Medical Security Law (Draft for Comments)* published by the National Healthcare Security Administration in June 2021 stipulates "charitable medical assistance" participation in medical security development in Article 22. However, neither law contains provisions on emerging technological productivity empowering digital charity medical assistance.

4.1 Main Conclusions

The overall completion rate of fundraising targets for digital charity medical assistance projects is less than 30%. Projects with different management fee extraction ratios show obvious disease-category differences in assistance value. There are large gaps in assistance amounts across disease categories, and project occurrence probabilities vary significantly. Children' s disease and emergency disease projects have relatively high probabilities of receiving donations, while most major disease categories such as tumors, blood diseases, genitourinary diseases, infectious diseases, and mental diseases have relatively low probabilities. Donations are mainly concentrated in a very small number of malignant tumor and blood disease projects, and the assistance value for most malignant tumor diseases lacks universal applicability across disease categories.

Laws, regulations, and policy documents have a significant substitution and

regulatory effect on the social regulation mechanism for digital charity medical assistance project fundraising, causing excessive fluctuations in long-term annual fundraising amounts and making the social marginal value equilibrium characteristics of digital charity medical assistance not particularly obvious. On the premise that public trust capital signals from charitable organizations, personal serious illness assistance seekers, and online platforms are effectively recognized by society, the value of digital charity medical assistance is positively correlated with the recognition of online fundraising channel effectiveness.

4.2 Optimal Allocation of Charitable Funds

(1) Exploring the Transition from "Good Governance" to "Regulatory Governance." "Good governance" and "regulatory governance" are two different forms of government administrative behavior, government service methods, and social governance models. Academic understanding of "good governance" varies. In this paper, "good governance" refers to the government not adopting coercive measures to intervene in charitable medical assistance resource providers' lawful, autonomous, and voluntary conduct of charitable business activities. "Regulatory governance" refers to the government, without affecting charitable medical assistance resource providers' lawful, autonomous, and voluntary conduct of charitable business activities, following the guiding ideology of "concentrating resources to accomplish major tasks" and "concentrating resources to treat serious diseases," adopting management methods such as formulating project guidelines, catalogs, and directories and building network information service platforms to guide charitable resources to precisely flow to medical assistance projects, targets, and regions that align with the national poverty alleviation and common prosperity strategies. The reasons and significance for this governance model transformation lie in the fact that China' s long-term adoption of the "good governance" management model has given charitable medical assistance resource providers great freedom but has led to prominent issues such as dispersed and inefficient use of donations, repetitive assistance projects, insufficient effective communication between charitable organizations and government departments, and poor cooperation effects among relevant government departments. Faced with scarce digital charity medical assistance resources and the trend of charitable digital intelligence transformation, the "regulatory governance" model is a reform direction worth exploring.

(2) Constructing an Administrative Management System Based on the "Regulatory Governance" Model. The transition from "good governance" to "regulatory governance" represents a major transformation in charitable thinking, requiring institutional and mechanism innovation. Currently, neither the Ministry of Civil Affairs nor the Healthcare Security Administration has charitable medical assistance as a primary responsibility. The Ministry of Civil Affairs is mainly responsible for managing charity development planning, charitable trusts, charitable fundraising, and other social donations based on "organizations," and has no authority to manage personal serious illness assis-

tance activities or the large amount of charitable medical assistance funds raised. The medical assistance managed by the Healthcare Security Administration, the temporary assistance managed by the Ministry of Civil Affairs, and the disease emergency assistance managed by the National Health Commission are all funded by fiscal funds and have nothing to do with charitable funds. Although the *Medical Security Law (Draft for Comments)* stipulates that "charitable medical assistance" participates in medical security development, it does not specify which department is responsible for this work. We propose exploring the establishment of an administrative management framework primarily led by "three ministries and commissions." The Healthcare Security Administration should take the lead in managing charitable medical assistance, formulating management measures at its level, regulating the use of charitable funds, and cracking down on fraud; building a project matching network platform and taking measures such as catalogs, guidelines, and directories to precisely direct fund flows; coordinating basic medical insurance, serious illness assistance, medical assistance, disease emergency assistance, and charitable medical assistance; adding charitable medical assistance data to the annual *Statistical Bulletin on Medical Security Development*, which should mainly publish content on charitable organizations, caring enterprises, personal assistance seekers, online platforms conducting or serving projects, data, charitable fund usage, and social benefits; and guiding research institutes and charitable medical assistance entities to compile industry development reports. The Ministry of Civil Affairs should continue to be responsible for social organization registration, supervision and management, and charity planning and management, but not for medical expense classification and grading, assistance project matching, charitable fund allocation guidance, or social benefit evaluation; it should guide the annual *China Charitable Donation Development Blue Book* compiled based on the China Charity Ranking to set up a special section for charitable medical assistance (referring only to the Ministry of Civil Affairs); provide the Healthcare Security Administration with information and data support on charitable activities; and participate in formulating management measures at its level. The National Health Commission should implement *GB/T14396-2016*, draw on DRGS construction ideas and application experience, classify and grade statistics on assisted diseases and medical expenses by disease category, provide data and information support to the Healthcare Security Administration, and participate in formulating management measures at its level.

(3) Establishing a Classified and Graded Medical Assistance Fund Financial Management System Centered on "Medical Expense Payment" Based on the "Regulatory Governance" Model. Currently, charitable medical assistance is mainly centered on "disease fundraising performance." Donors typically make donation decisions based on disease category, condition description and severity, patient identity, and emergency nature. Donors, charitable organizations, and online platforms pay relatively weak attention to the post-fundraising use of charitable funds. Since donations are mainly concentrated in a very small number of tumor projects with relatively high medical expenses,

as well as children' s and emergency projects, we can follow the guiding ideology of "concentrating resources to accomplish major tasks" and the principle of "regulatory governance," drawing on DRGS construction ideas and application experience to establish a classified and graded financial management system centered on "medical expense payment" to use charitable fund resources in a concentrated and efficient manner. Medical assistance for non-emergency diseases can be implemented according to the diseases listed in *GB/T14396-2016*; medical assistance for emergency diseases can be implemented according to the diseases listed in the *Standards and Diagnosis and Treatment Specifications for Emergency and Critical Illnesses Requiring Emergency Treatment*.

The Healthcare Security Administration can explore establishing a charitable fund usage risk management and control system, studying the logical relationship and mechanism of action between risk factors and charitable fund usage to provide key information for controlling charitable fund usage. Key considerations should include direct or indirect major influencing factors that cannot accurately reflect actual charitable fund usage, such as moral hazard, psychological risk, substantive disease risk, and excessive use of charitable funds by patients and their close relatives. The National Health Commission should provide medical expense data and information on emergency, children' s, and malignant tumor diseases to guide charitable funds to precisely flow to malignant tumor and blood diseases with high incidence and high medical expenses.

(4) Establishing a Benefit Evaluation System Centered on "Social Value Creation" Based on the "Regulatory Governance" Model. China has not yet used "social value creation" as the core measure of charitable medical assistance contributions, nor has it used sustainable "social value creation" as a core indicator for evaluating the high-quality development of charitable medical assistance. In the future, we can follow the "regulatory governance" governance thinking and principles to shift evaluation from being centered on "disease fundraising performance"to being centered on "social value creation."We should attach importance to online medical services and management, formulate methods for discounting online charitable service amounts, and guide charitable organizations to gradually shift from emphasizing fundraising to emphasizing the accumulation of charitable social capital.

We should formulate a "social value creation" action program for charitable medical assistance to promote charitable organizations, online platforms, caring enterprises, and caring individuals to deeply understand the relationship between the third distribution, poverty alleviation, and common prosperity, including guiding the main directions and specific methods for charitable resource providers to participate in poverty alleviation and common prosperity. For caring enterprises and entrepreneurs who donate continuously and in large amounts, there should be fiscal and tax policy support measures and social honor incentive methods; we should respect caring enterprises and entrepreneurs' considerations for pursuing social reputation capital, and it is not appropriate to include charitable behavior in the social credit system for the time being, but the credit

system can be set up as an incentive system. We should explore establishing a six-level charitable medical assistance incentive mechanism and social honor reward mechanism at the national, provincial, municipal, county, township, and community levels.

(5) Improving the Legal and Regulatory System for Digital Charity Medical Assistance. During the revision of the *Charity Law*, *Social Assistance Law*, *Interim Measures for Social Assistance*, and *Medical Security Law*, provisions on digital charity medical assistance should be added. Provisions on digital charity medical assistance should be added based on Article 3 of the *Charity Law* and Articles 2 and 22 of the *Medical Security Law (Draft for Comments)*. We should explore establishing a national digital charity medical assistance resource statistics and assistance effectiveness publishing system, standardize the statistical scope and methods for charitable resources, estimate the total volume, and clarify the baseline data. We should explore establishing a digital charitable service resource discounting and value evaluation system. Disease classifications should be determined according to the national standard *GB/T14396-2016*, gradually changing the practice of using standards such as the "National Scope of Serious and Critical Illness Medical Assistance Diseases," *Standards and Diagnosis and Treatment Specifications for Emergency and Critical Illnesses Requiring Emergency Treatment*, and *Specifications for the Use of Disease Definitions in Critical Illness Insurance* to classify diseases.

(6) Using Emerging Technologies to Enhance the Social Benefits of Digital Charity Medical Assistance. The state should accurately grasp the development trend of digital charity, formulate a sustainable development strategy for emerging technology-empowered charitable medical assistance, and solve problems such as low trust in online fundraising activities, weak digital foundations in the charity industry, and insufficient digital charity talent. After the implementation of the newly revised *Charity Law*, the Ministry of Civil Affairs and the Healthcare Security Administration should formulate departmental regulations or special policies based on the provisions of the *Charity Law* on new technologies such as big data, cloud computing, and blockchain empowering charitable medical assistance. At the same time, they should closely track global emerging technology frontier trends and learn from foreign experience.

In the past two years, the value of some emerging technological productivity in empowering digital charity has been positively verified by some foreign research teams. For example, the blockchain trust solution mechanism for epidemic diseases such as Covid-19 designed by the Indian team of M. Kaur, P. D. Kaur, and S. K. Sood; Australian scholar Luis Arango (2023) and others used experimental methods to verify that ChatGPT AI-generated images have a positive promotional effect on the construction of digital charity social value [44]; Korean scholar Seyoung Lee and US scholar Gain Park (2023) used a controlled experimental method (593 US citizens) to prove that emotional confession chatbot interactions with experimental subjects can enhance their donation willingness [45]. These findings have reference significance for the development of digital

charity medical assistance in China.

We should grasp the development sequence and key application scenarios of AR, VR, AI, and metaverse empowerment of charitable medical assistance. Currently, there is controversy in global academic and industrial circles around the development sequence and key application scenario construction of AR, VR, MR, AI, and metaverse. Metaverse advocate Mark Zuckerberg advocates prioritizing VR industry development, while John Hanke, CEO of US Niantic Technology Company, advocates prioritizing AR industry development [46]. These controversies are both disputes between realism and futurism in ideological schools and disputes over future industry models centered on economic interests. Against this background, considering the current situation of charitable medical assistance in China and the maturity of emerging digital technologies and the general progress of application scenario construction, we can first use AR technology to enhance the attractiveness of charitable assistance activities on the technical path, and then develop VR charitable industries and new charitable metaverse business forms.

Charitable organizations should improve their own digital construction capabilities. They should use AR and VR technologies to enhance word-of-mouth effects; explore new models of cryptocurrency donation; use automatic push and algorithm technologies to provide personalized charitable information for donors, provide online medical services such as psychological comfort, and cultivate mature and flat digital charity medical assistance long-tail curves. They should use personalized fundraising models such as gamified rewards to attract Generation Z and Generation Y, handle logical conflicts between digital technology tools and humanistic values, consider donors' emotional value, maintain long-term relationships, and enhance the long-tail effect. They should learn from the valuable experience accumulated by Ant Financial Public Welfare and Qingsongchou (which established the Sunshine Public Welfare Alliance Chain in 2017) in using blockchain to develop charity, and use blockchain to permanently track the flow of charitable funds to improve trust.

Online platforms can use AI intelligent humans to provide 24-hour × 365-day services in the metaverse, display projects, and answer questions; they can use virtual digital humans of personal serious illness assistance seekers and implementing parties to interact with caring people. Considering that the metaverse + charitable medical assistance model is not yet mature, online platforms can prioritize uploading disease assistance projects with high public attention and high donation probability, such as emergency projects, children' s projects, and projects for diseases with high incidence rates such as lung cancer, breast cancer, liver cancer, gastric cancer, colorectal cancer, leukemia, brain tumors, and lymphoma. They should explore the "metaverse + charitable medical assistance + NFT" model, donate NFT souvenirs to donors, and leverage the advantages of digital collectibles. They should improve platform interface perception warmth and attractiveness, set up functions such as browsing, skipping, returning, and recording pages, and publicize project progress and final reports. Foreign-related

research shows that innovative platform website interface construction can increase fundraising amounts. The Indonesian team of Intan Permana (2019) verified that platform innovation has a positive impact on public donation willingness [47]. The US team of Kwak, D-H (2023) used experimental control methods (217 US volunteers) to verify that perceived interface design consistency can increase charitable platform perception warmth and attractiveness, which is conducive to improving public donation willingness [48]. Given technical constraints such as network information platform storage capacity, computing power, and network transmission speed, online platforms can first learn from relevant experience and attempt to explore metaverse + charitable medical assistance application scenarios (Tencent has already laid out XR metaverse, and Baidu has developed the metaverse product "Xirang").

This paper also has limitations. For example, the discounting of online medical services value such as digital medical resource matching, online consultation, and remote consultation, as well as the revelation of the internal mechanisms of application scenarios where emerging technological productivity empowers digital charity medical assistance.

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Author Contribution Statement:

Shao Xiangdong: Conceived the research design and methodology, interpreted research results and drew conclusions, wrote and revised the paper.
Wang Mengtong: Wrote and revised the paper.

Note: Figure translations are in progress. See original paper for figures.