ASIAN HORIZONS

Special Issue 1, January 2022 Pages: 19-31

COVID-19 AND CHALLENGES IN HEALTHCARE: CARE OF THE ELDERLY, ALLOCATION OF HEALTH CARE RESOURCES & ETHICS OF TREATMENT AND VACCINES

Francis Chittuparambil, OCD⁺

Abstract

The covid pandemic severely affected the health care system of all countries irrespective of the economic status, literacy rate or government power. As a result, a number of moral issues emerged like the care of the elderly and the persons with co-morbidities, the just allocation of the scarce medical resources and the morality of getting vaccinated and of some vaccines. The role of hospital ethical committees in the decision making process is crucial in such situations. The parable of Good Samaritan (Lk 10:30-37) is a guiding example in the safe moral handling of this emergency situation. Each health care personnel is called to be another Good Samaritan. The allocation of the scarce medical resources need to follow clear ethical guidelines and principles. This paper analyses these crucial issues, trying to present the available data, and then dealing the problem with the help of bioethical principles, proposing the ethical approaches to be undertaken and finally presenting our own observations and conclusions.

[◆]Francis Chittuparambil, OCD holds a doctorate in Moral Theology from Alphonsian Academy in Rome, with the dissertation entitled: "Human Body in Bioethics – Christian and Upanishadic Perspectives". He was a permanent professor of Moral Theology in *Teresianum*, Rome (2006-2017) and a visiting professor in *Urbanianum*, Rome and other faculties in India & Africa. At present he is the Rector of Carmelaram Theology College, Bengaluru and teaches Moral Theology in several faculties in India. His special field of interest are Bioethics, Moral theology and Spirituality. Email: fchittu@hotmail.com

Keywords: Allocation of Medical Resources; Care of the Aged; Covid-19 & Moral Issues; Ethical Principles; Ethical Committees; Good Samaritan; Vaccination against Covid.

Introduction

We fell asleep in one world and woke up in another, suddenly Disney is out of magic, Paris is no longer romantic; New York doesn't stand up any more. The Chinese wall is no longer a fortress and Mecca is empty. Hugs and kisses suddenly become weapons, and not visiting parents and friends becomes an act of love; suddenly you realise that power, beauty and money are worthless and can't get you the oxygen you are fighting for; the world continues its life and is beautiful. It only puts humans in cages; It's sending us a message: You are not absolute; the air, water and sky without you are better. When you come back remember that you are stewards, not masters of this world.¹

This anonymous quote presents the situation of the world in these Covid pandemic years. The human beings, who considered themselves to be the crown of creation (Cf. Gen 1:26), find themselves helpless and cornered in many of the life situations after the eruption of the Corona virus towards the end of the year 2019 till today. Presently, India is reeling under or just coming out of the second wave of the virus which caused unimaginable devastation than the first one and is trying to find out solutions for the manifold problems that this crisis presents. A third wave is already predicted.

The true origin of Corona virus is still disputed; whether it is manmade or due to some other reasons is still an unsolved and at the same time an irrelevant point of dispute. One thing we know for sure is that it affected the health care system of all countries very badly, irrespective of whether poor or rich, powerful or less powerful, literate or illiterate, and the number of sudden and untimely deaths as well as the number of infected are continuously on the increase.

Pope Francis in his Encyclical *Fratelli Tutti* exposed the effects of the pandemic. In effect, the Pope writes, the pandemic has brought to the daylight not only our false securities but also the inability of the different countries to work together. For all our hyper-connectivity, we witnessed a fragmentation that made it more difficult to resolve problems that affect us all.² The pandemic Covid 19 has brought in a number of health care issues which were not very common till the

¹This quote, whose author is unknown, was circulated in 2020. Quoted here with my own adaptations.

²Cf. Francis, *Fratelli Tutti*, Encyclical letter, Vatican City, 3 October 2020, no. 7; Also Pope Francis' message to the plenary session of the Pontifical Academy of sciences, Vatican Oct 7-9, 2020.

end of the year 2019. Prominent among them are the care of the elderly and the physically vulnerable, the just allocation of the scarce medical resources and finally the morality of treatments and getting vaccinated. The role of ethical committees in hospitals in evaluating and deciding the procedure of treatments to be followed in certain medical dilemmas is also referred to. This paper analyses these crucial issues, trying to present the available data, and then dealing the problem with the help of bioethical principles, proposing the ethical approaches to be undertaken and finally presenting our own observations and conclusions.

1. Covid-19 and the Care of the Elderly

Ageing is a not a novelty and it becomes conspicuous in the developed and super developed countries where there is high level of life expectancy and the consequent high number of elderly in the society. Robert Neil Butler in 1969 coined the term *ageism* to describe the stereotyping or discrimination against individuals based on their age. Ageing process presents crucial ethical consequences especially in the time of pandemic covid. The age group that was worst hit by the Corona Virus is those above 60 yrs. age. Italy, one of the European countries that was affected severely during the first wave in 2020 reported the death of a great number of people over 50 years of age, claiming approximately 35.6 thousand lives; the mortality rate appeared to be higher for the elderly patients. In fact, for people between 80 and 89 years of age, the fatality rate was 33.9 percent (14586 deaths). For patients older than 90 years this figure was 33.2 percent (6513 deaths). Overall, the mortality rate of coronavirus in Italy reached 12.3 percent, higher than that registered in most countries." 3 Age group 50-59 reported death rate of 2.5% (313 persons); 60-69 - 10% (3575 persons); 70-79 - 25.6% (9321 deaths).

The severe second and third wave of COVID-19 has affected India also very badly over recent weeks. The number of newly infected are reaching new heights; for over a week in the month of May 2021, India recorded around 350,000 new cases each day. A majority of the COVID-19 cases in India affected people between ages 45 and above as of March 2021 and the age group between 60 and 74 years had the highest share of deaths. Patients over the age of 45 years, who form 25% of the country's population, account for 88% of India's Covid-19 deaths, the Union health ministry said on March 24, 2021. The findings about the age-wise distribution of deaths due to

³ https://www.statista.com/statistics/1106372/coronavirus-death-rate-by-age-group-italy/

the covid in India are in line with what is observed about the global trends — it is disproportionally fatal for those who are older.⁴

During the third wave of covid-19, named as Omicron variant, a comparatively younger population was more affected, as the average age of hospitalization was 44, compared to the second wave when it was 55. The third wave is characterised with more percentage of vaccinated people and lesser use of drugs and related issues. It is observed that the third wave is waning in India.

These facts take us to the gruesome reality of the care of the elderly in our homes as well as in the care centres. The contemporary man lives with the obsession of long life and thus finds it difficult to accept death even at an advanced age. The science and medical technology are considered as the tools to achieve longer life at the cost of anything. 'As the 20th century is known as the century of demographic growth, the 21st century is known as the century of ageing of the population'. This factor is closely related also to the question of reduction in the number of births and prolongation of the life expectancy especially due to the advancement in medicine and researches and the victory in our fight against the epidemics.⁵

While speaking about the medical and ethical aspects of the care of the aged we need to deal with the diffused mentality existing in our culture of the mechanistic and utilitarian concepts of life. The prevalent tendency in the world is to consider *having* and *doing* as important. However, the life of a human being, even at the time of his old age transcends both these. He is richer ontologically than having or possessing many things and doing different things and this is especially due to his God-given dignity of being created as the child of God and being gifted with the rational capacity. This fact remains unchanged even when he is not in a position to make use of the rational capacities. Our culture tends to supress this metaphysical and transcendental nature of man in the old age due to the influence of the utilitarian mentality, resulting in marginalization of the elderly. The old age is considered to be unproductive, useless and role-less in life, living in solitude and as a burden to the society and to the family.

The daily newspapers in this time of Covid Pandemic brought in almost continually the news about the death of patients due to lack of sufficient life supporting instruments or medical personnel to care for

⁴ https://timesofindia.indiatimes.com/india/88-of-all-covid-19-deaths-in-indiain-age-group-of-45-years-and-above-government/articleshow/81672749.cms

⁵Cf. S.J. Olshansky, Life expectancy and Life Span, in Reich, ed., Encyclopaedia of Bioethics, I, 88-91.

them. Pope Francis in *Fratelli Tutti* no. 19 refers to this fact happening in the whole world: "In this way what is thrown away are not food and dispensable objects, but often human beings themselves. We have seen what happened with the elderly in certain places in our world as a result of the corona virus. Thy did not have to die that way." This duty to care for the aged is constantly impelling us to be human and Christian in a qualitative manner as the parable of the good Samaritan demonstrates.

The parable of Good Samaritan (Lk 10:30-37)⁶ is a guiding example in this time of pandemic, as we spent our energy and resources to take care of the sick and the aged, much more than ever. To each health care personnel this covid time is a call to be a Good Samaritan like Jesus Himself who comes with the divine healing through everyone who spends time and energy in taking care of the sick.

The Good Samaritan who goes out of his way to aid an injured man (cf. Lk 10:30-37) signifies Jesus Christ who encounters man in need of salvation and cares for his wounds and suffering with "the oil of consolation and the wine of hope." He is the physician of souls and bodies, "the faithful witness" (Rev 3:14) of the divine salvific presence in the world.⁷

The Samaritan encounters the wounded person, so far unknown to him on the wayside. Almost in majority of the cases the health care personnel take care of unknown people and the mask and PPE kit that they wear make them to remain in anonymity.

2. Allocation of Healthcare Resources

The word "allocation" means an act of the distribution of resources and it does not mean reduction of the things to be distributed.⁸ The *rationing* of resources is a connected word which means 'the distribution of the limited resources according to some specific criteria where the needs of persons are uniform and the access to the resources are restricted since they are not abundant. The covid pandemic made us to be conscious of, more than ever, an important issue in the health care system that there are never sufficient medical and health care resources for the needy. The medical resources are always limited and the demand is greater. The reports were pouring in the daily newspapers of March–May 2021 that the ventilators and

⁶Cf. Francis, Fratelli Tutti, Rome, 2020, Second Chapter.

⁷Congregation for the Doctrine of Faith (CDF), *Samaritanus Bonus*, on the care of persons in the critical and terminal phases of life, Letter, 14 July 2020, Intro.

⁸Cf. World Medical Association, ed., *Discussion document on the Ethical Aspects*, 1996.

ICU beds are fully occupied and the ambulances were lining up in front of the hospitals with patients waiting for these life supporting instruments. The medical personnel find difficulty in choosing whom to serve and often makes the most painful choice of removing oxygen cylinders from those who have less hope of survival. The just allocation of available resources is a factor on which everyone agrees. This particular need is felt now in the higher levels of health ministry as well as in the smaller hospitals and even in the First Line Treatment Centres (FLTC). Both the affluent and the poor countries face this crucial problem.

The resources can be classified into primary, secondary and tertiary: Among the primary resources we may include body organs like kidneys, heart, lungs etc. The secondary resources are the life supporting machines like ventilators, hospital beds, essential drugs etc. The tertiary resources may include other essential commodities like the masks, gloves, the structures etc. Though we have classified these into three, it often happens that the tertiary resources may be urgently needed on some occasions. As far as the Corona virus disease is concerned the secondary and tertiary resources are more important than the primary ones.9 The time and care given by the medical personnel and health workers are also important resources. They also face the serious question of "who should be given what" in an emergency situation like covid cases. A delay, negligence or error in this factor would negatively affect the interest of the patients. It's an urgent ethical preoccupation in the medical field to identify the ethical issues in relation to the just and fair allocation of these scarce resources to the maximum number of people. Everyone wants the best resources in the speediest manner so that the patient may get healed at the earliest and in the best way possible. It's rather impossible to satisfy everyone especially when the resources are limited. Here comes the delicate duty of fairly prioritizing the beneficiaries in the light of different guiding principles and forming the various approaches to this urgent task.

3. Ethics of Vaccines against Corona

Two major issues are discussed here: first we discuss about whether one has the moral obligation of getting vaccinated and secondly regarding the morality of some vaccines itself. Getting vaccinated against the corona virus has become not only a medical

⁹ Ghaiath M.A. Hussein, *Module* 12 – *Resource allocation in Health care*, 147. Downloaded from https://www.slideshare.net/ghaiath/module-12-resource-allocation-in-health-care (12/07/2021).

question, but also a question of conscience in these recent months. The effects and consequences of the vaccine are still ambiguous and disputed. Should we get a vaccine whose effectiveness in controlling the virus is not yet guaranteed? Opinions go to the extreme of stating that the vaccine may lead even to impotency. In the face of such allegations, is getting vaccinated a moral obligation? Anyhow, the milder symptoms during the third wave is attributed, rightly or wrongly, to the higher percentage of vaccinated people. Important issues emerging in the ethics of vaccination are the moral obligation to get vaccinated, fair allotment of vaccines and the morality of vaccines produced from the cell lines of aborted foetuses.

Vaccination, as far the evidences indicate, is the best available prevention against the corona virus and its spreading, together with the face mask and sanitization and physical distance from others. The inexplicable suffering of the patients and the pain over the death of loved ones without even able to pay the last respects or a dignified burial, demand us to avoid by all means available to keep oneself and others also away from the grip of the corona virus. The Congregation of the Doctrine of Faith, in its *Note on the morality of using some anti-covid 19 vaccines*,¹⁰ stated that the use of vaccines that are available in the market does not involve complicity with evil. Getting vaccinated is to be seen as a sign of fraternity and a moral obligation, since charity demands us to take care of ourselves as well as others. In this regard, the same document asserts:

... the morality of vaccination depends not only on the duty to protect one's own health, but also on the duty to pursue the common good. In the absence of other means to stop or even prevent the epidemic, the common good may recommend vaccination, especially to protect the weakest and most exposed.

Vatican's Covid-19 Commission & Pontifical Academy for Life issued another document pointing out 20 points for a fairer and healthier world also highlights the obligation of getting vaccinated as a form of justice and charity.¹¹

The principle of equity is to be observed in the allocation of the vaccines—priority to the neediest and the weakest. It becomes the obligation of the concerned authorities to make sure that there is a fair and just distribution of the vaccine.

¹⁰Congregation for the Doctrine of Faith (CDF), *Note on the Morality of Using Some Anti-covid 19 Vaccines*, Vatican, 21 December 2020.

¹¹Cf. Vatican Covid-19 Commission & The Pontifical Academy for Life, *Vaccine for All.* 20 Points for a Fairer and Healthier World, 29 Dec. 2020.

Another point that disturbs the conscience of many Christians is the feasibility of getting vaccines *that have used cell lines from aborted foetuses in their research and production process.* The paragraph no. 2 of the document of the CDF helps to solve the moral dilemma regarding the vaccine against covid: "When ethically irreproachable Covid-19 vaccines are not available ... it is morally acceptable to receive Covid-19 *vaccines that have used cell lines from aborted foetuses in their research and production process.*"

4. Guiding Ethical Principles

Let me present some of the main ethical *principles* that should govern the decision making in the allocation of Health care resources as well as treatments during an emergency situation in a Covid care centre.

a. Principle of Value and Respect for Persons

First and foremost, in a situation like the covid pandemic the value and preciousness of human life and human person must be respected at all cost and by every means. In addition, and as a consequence, the dignity, respect etc. that are due to every human being must be mandatory. The Congregation for the Doctrine of Faith underlines the fact of the value of human life and the inherent dignity of the same: "Human life is the basis of all goods, and is the necessary source and condition of every human activity and of all society"¹². Pope Francis never gets tired of emphasising the human dignity. The latest Encyclical *Fratelli Tutti* (2020) has these words: "... by acknowledging the dignity of each human person, we can contribute to the rebirth of a universal aspiration to fraternity."¹³ This is a basic and universal principle of human life that should govern every ethical practice of the medical field. There are other principles that are particularly applicable in relation to Corona cases.

b. The Principle of Justice

Justice is an intersubjective concept. What we mean by justice in this case are the distributive and commutative justice. It is in fact, fairness in the allocation of medical care and medicines in an interpersonal (patient and the health worker) and top to bottom level (Government or health department to patients). Everybody wants the health care personnel and systems to be fair. Often this fairness is understood to be the expectations of the patient and his or her family

 $^{^{12}\}mbox{Congregation}$ for The Doctrine of Faith (CDF), "Declaration on Euthanasia," 5 May 1980, Part I.

¹³Francis, Fratelli Tutti, (3 October 2020), no. 8.

members. However, we know that such expectations would be often led by a dominant utilitarian and personal desires, the worries and anxieties of the time and so may not be always fair. Any care to the patients should be free of any bias based on gender, social status, relationships etc. To each one according to his/her medical need. Armstrong and Whitlock opines that the criteria governing the just distribution of scarce resources are: need, equality, contribution, ability to pay, effort, and merit.¹⁴

c. The Principle of Beneficence

This principle reminds the health care personnel that whatever they do should be for the good of the patient, that they should never do any harm to the patients (principle of non-maleficence). In the context of Covid-19 many vaccines are being produced and supplied. The experimentations and trails of these vaccines should always take into consideration the well-being and good of the patient. We remember the controversy of hydrochloroxine vaccine produced massively by India in 2020 and distributed to many countries and many other vaccines now being produced and experimented. They should be tried on human beings only if it is proved that they wouldn't cause any negative effect. Who should be given priority in giving these vaccines is an important issue, as it wouldn't be accessible to everyone initially.

d. Principle of Equity

The principle of equity states that the social services are to be delivered equitably. This principle is based on the ideals of justice and fairness. Equity and equality are not the same principle, though they are often used interchangeably and both aim at promoting justice and fairness. The principle of equity considers and gives people what they need so that they may enjoy a healthy, happy, contented and serene life. On the contrary, the principle of equality states that everyone should get the same thing in the same quantity and quality, so that all members in the society may be happy and healthy. The social exigencies prevail over the individual needs. The commutative justice is minimum and the distributive justice is prevalent. "To every individual equally" is the governing maxim in the principle of equality.

In the area of health care, the principle of equality may seem fair apparently, but a deeper evaluation would reveal that it promotes injustice since it does not take into consideration the poor and the

¹⁴Cf. Armstrong R., & Whitlock R., "The Cost of Care: Two Troublesome Cases in Health Care Ethics," *The Physician Executive* 24, 6, 1998, 32-35.

vulnerable. Equality may be just when everyone has the same health care needs and health status. But we know that it is not the reality as far as the Covid pandemic is concerned, as the pandemic never considers the social or cultural status of the person.

The principle of equity can be considered as the means by which equality is achieved.

e. The Principle of Autonomy of the Patient

Every individual has the right to make choices that deal with his or her own health, which at the same time shouldn't limit or curtail the same types of rights of others. Covid treatment centres should give priority to this factor.

Having briefly stated the different principles, we conclude that it is not one or other principle that should be followed in the treatment of covid patients. One should keep in mind all the principles, since a human and Christian approach demands all of these.

5. Ethical Approaches to the Problem of Scarcity

The principles alone cannot guide us properly in the moral process of decision making, even when it contributes substantially in our finding out a viable solution for the issue at hand. We need also the practical guidelines. Pope Francis in his message on March 23, 2021 marking the 150th anniversary of the proclamation of St Alphonsus Liguori as the doctor of the Church emphasized this point: "Moral theology cannot reflect only on the formulation of principles, of rules, but needs to be proactive about the reality that exceeds any idea (Cf EG 231)."¹⁵ St. Alphonse, the patron of Moral theologians presents the practical guidelines in his *Theologia Moralis* (1748) that become useful in the process of decision making. His theory of *equiprobabilism* points out the need for going beyond the mechanical application of the laws and principles.

Here we analyse different ethical approaches that are to be undertaken in different circumstances. The ethical obligations towards the patients include fairness, utility, beneficence and the interests of the patients. Timely decisions and allocations are also important. Any delay in this process would negatively affect the interest and even the life of the patient. Every institution should have guidance given by the ethical committees constituted of doctors and ethicists.

¹⁵Cf. message of his holiness Pope Francis to mark the 150th anniversary of the proclamation of St Alphonsus Maria de Liguori Doctor Ecclesiae, St John Lateran, Rome, 23 March 2021, www.vatican.va.

a. Utilitarian Approach

This is often the most common approach followed in the question of allocation of resources. Maximum good for the maximum number of people. The ethically right action is considered to be the one that gives maximum satisfaction to as many people as possible. According to our Christian value system and even in the light of rational principles we may not be able to accept this as a valid ethical principle in the case of the allocation of resources.

b. Deontological Approach

According to this approach one should always act in accordance with the duties towards the patients without looking into other factors or availability of resources. The duty of a doctor is always to work for the healing of the patient. The doctor must be able to find proper balancing with regard to his duty and the ethical consequences that follow it.

c. Cost-Effective Approach

The allocation of resources has to take into consideration the costeffectiveness factor. The spending of the resources that are at work in the healing process must bring in the desired just effect. Projects whose effectiveness is much less compared to the cost invested are less likely to be just. There must always be a 'cost-effective-analysis' (CEA) in the allocation of these scarce resources. This cost effective analysis makes it possible to determine the relative efficiency in comparison with alternative health interventions. The cost-effective limited resources in the medical field should be allocated to maximize the health benefits. Cost is measured in terms of money and other services whereas the effect in terms of improvement in healing. In the cost-effective analysis priority must be given to the success of the medical initiatives.

d. A Fair Process Approach

Fair process approach consists in procedural justice when a fair distribution is not possible. It consists in the very same process itself. Values to be safeguarded are transparency and participation in the allocation. Transparency consists in making known to the patients and to the immediate concerned persons the processes and bases of decisions. The effectiveness and the relevance of the steps taken must also be sufficiently revealed to the concerned parties. Further, the affected people must be made to participate as far as possible both in the policy making and decision making processes as well as in its later actual execution.

e. Personalist Approach

Here priority is given to the persons in need, irrespective of their provenience or influence. The gravity of the sickness and the urgency of the situation only are taken into consideration. Here the criterion is proportionality. To ensure a quick and effective healing and to safeguard the person and his goods, the primacy is given to the clinical factors over and above the economical, productive and social factors.¹⁶ The governing principle is the fact that a society should guarantee the right to the necessary medical intervention of every one of its members irrespective of the individual's capacity. The traditional catholic concepts of proportionate and disproportionate means of treatment and ordinary and extra-ordinary cares are relevant here. Special consideration is to be given to the more vulnerable portion of the society. In this approach, the efficiency and efficacy of the allocation is ascertained and the waste is to be absolutely avoided. What is emphasised is to rationalise the allocation rather than rationing it.

f. General Social Value/Merit Approach

This approach is employed where priority in allocating resources is given to those who have greater social worth in terms of their past, present or future services to the society. The doctors and other health care workers are thus preferred to the simple category of persons. Politicians are always considered, justly or unjustly, the primary beneficiaries according to this approach. In the same way, parents on whom depend the lives of children and such categories are also given priority in allocating resources.

g. Other Approaches

Finally, let me state some other approaches like the system of queue where a *first come first served* method is followed or random selection especially when new medicines are to be experimented or when a clear criterion cannot be followed due to several factors. A final criterion is the ability to pay for the medical resources and services. This last one is often the most used one in several areas of medical field.

The role of the ethical committees in the allocation of resources and ethical approaches in the treatment of the Covid patients is important. Every major treatment centre should have an ethical committee comprising of experts in medical and ethical field. The *modus operandi* of the ethical committees are to be determined

¹⁶Cf. Elio Sgreccia, Manuale di bioetica, II, Milano: Vita Pensiero, 2002, 585.

beforehand taking into consideration the civil laws, religious and personal beliefs. However, some important elements to be taken into consideration by the ethical committees are the following: Clear identification of the issue by studying the facts; analysis of the ethical issue and the circumstances involved; identifying the several just options and the values and rights involved in each; selection and implementation of the decision in the light of the principles. An evaluation of the decision by a peer committee of experts would give additional force for the decision made. The approach by the ethical committees and medical personal should be a personalist approach where each patient is considered unique and his or her needs are met in a dignified manner.

Conclusion

While addressing the members of the Pontifical Academy of Sciences Pope Francis said: "Together with the contribution of the sciences, the needs of the poorer members of our human family cry out for equitable solutions on the part of governments and all decision-makers. Healthcare systems, for example, need to become much more inclusive and accessible to the disadvantaged and those living in low-income countries. If anyone should be given preference, let it be the neediest and the most vulnerable among us. Similarly, when vaccines become available, equitable access to them must be ensured regardless of income, always starting with the least." 17 Covid-19 pandemic is to be considered not as the end of the world or of human beings but as a crucible, whether man-made or willed by God, that has slowed down the existing, amoral trends especially in the care of the aged and in the allocation of the resources. In fact, it brings out both the worst and, in some cases, even the best in our human nature, calling us to re-examine the present management style of our resources. Let me conclude quoting the urgent appeal of Pope Francis in Fratelli Tutti: "The pain, uncertainty and fear, and the realization of our own limitations, brought on by the pandemic have only made it all the more urgent that we rethink our styles of life, our relationships, the organization of our societies and, above all, the meaning of our existence."18

¹⁷Francis, Message to the Pontifical Academy of sciences, Vatican Oct 7-9, 2020. Downloaded from https://zenit.org/2020/10/07/popes-message-to-plenarysession-of-pontifical-academy-of-sciences/

¹⁸Francis, Fratelli Tutti, no. 33