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Bats Act as a Natural-Booster-Community-Vaccine Against COVID-19

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A B S T R A C T

Presently the pandemic-Coronavirus-disease-2019 (COVID-19) caused by coronavirus-2 (SARS-CoV-2), is highly infective, and often causes severe acute and/or long-term illness, and is badly impacted on global-health-ecology-medical-pharmaceutical-education-clinical-research-agriculture-forestry-horticulture-environment-wildlife-conservation-biodiversity-science-technology-communication-socio-economy-issues, even in countries with sophisticated-medical-facilities. Still, now no 'Buster-Dose-Vaccine' is discovered for permanently preventing 21st-century-pandemic. On the other hand, food production in midday-meal kitchen-gardens and agriculture significantly reduces due to different-pests-attacks. So, to tackle and overcome both the situations, the naturally-growing "Wildlife-Conservation-Project of 'Bats-Breeding' in the Heritage-School, Burdwan-Raj-Collegiate-School" forming a 'Complex-Typical-Ecosystem' in the food-chain-relationships-landscaping by trees-park-garden-playground-ponds with nearby Damodar-and-Banka-river, agriculture-horticulture-brave-yard forming the 'Location-Wise an ideal Place' for keeping-and-caring of 'Wild-Bats', the natural-reservoirs-of-a-diverse-range-of-viruses, and recently, the similar-coronaviruses of healthy-bats cause serious-COVID-19 disease in humans-and-other-mammals, showing asymptomatic-carriers with well-adapted-to-urban-environments of the 'Burdwan-Municipality-and-surroundings' due to the dramatic-adaptive-capacity to occupy-diverse-ecological-niches. Here, the bats not only control the different pests in agriculture-and-pisciculture etc., increasing food production, but also plays a vital role in preventing the high-rate-of-morbidity-and-mortality, showing the "Wild-Bat Act as a Natural-Booster-Community-Vaccine-Immunization Against COVID-19", and developing-and-administering-potentially life-saving-immunomodulatory-therapies by improving-natural-immunities, and confirms and provides-"Preventive-Community-Health-Care-Health-Risk-Services-Healthy-Lifestyle-Clinical-Research-Education-and-Enriched-Wildlife-Biodiversity-Conservation-Agriculture-Forestry-Environments-Socioeconomy-Medical-Pharmaceutical-Science-Technology-Communication-Application-Issues with Joyful-Learning-Environment-with-Human-Health-Ecology, and Food-Chain-Relationships, and Community as Well as Families'-Health-Awareness-Development". They are also opening a path of more future-research-and-communication, for the betterment of the society benefitting global-humanity by advancing innovations in the fields of scientific-clinical-research, and needs for such therapies in COVID-19, especially for the emergence of variants-concern that may pose new challenges for medicated-vaccines and neutralizing-antibodies for the future-epidemic enhancing the success of clinical trials for therapeutics, and the recommendation for multiple-immune-targets as candidates for the treatment, prevention and management of COVID-19 like various-variant-virus-diseases also.

Keywords: *Bats; Natural-Booster-Community-Vaccine-Against-COVID-19; Preventive-Health-Care-Services-Healthy-Lifestyle; Enriched-Wildlife-Conservation-Agriculture-Forestry; Medical-Pharmaceutical-Science-Technology-Communication-Application-Issues*

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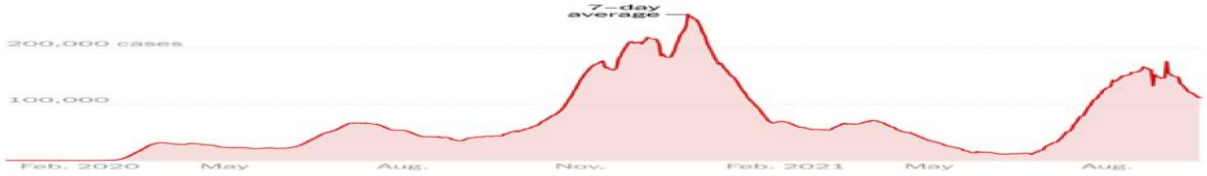
INTRODUCTION

The recent pandemic-Coronavirus-disease-2019 (COVID-19) caused by 7th-coronavirus-2 (SARS-CoV-2), is highly infective, and often causes severe acute and/or long-term illness, and is badly impacted on global-health-ecology-medical-pharmaceutical-education-clinical-research-agriculture-forestry-horticulture-environment-wildlife-conservation-biodiversity-science-technology-communication-socio-economy-issues, even in countries with sophisticated-medical-facilities, and post-vaccination also, and bats act as a viral reservoir from a physiological and ecological perspective [1-29]. Still, now several vaccines have come up with limited efficacy in managing COVID-19 disease with the advanced stage of their release [30-32]. Still, now no potential 'Buster-Dose-Vaccine' is discovered for permanently preventing 21st-century-pandemic because the "Concerns over waning immunity and SARS-CoV-2 variants have convinced some countries to deploy extra vaccine

doses which not clear to scientists whether most people need them" [33]. Apart from this, many new chemical entities and re-purposed drugs like 'Remdesivir, Favipiravir, Galidesivir, Actemra, Azithromycin, Thalidomide, Hydroxychloroquine/Chloroquine, and Ivermectin in combination with doxycycline', currently used for managing COVID-19 disease showing very limited efficacy [34,35].

In the New York Times, 2nd-October 2021, 9:25 AM, Saturday, Wolfe J. (Figure 1), reported that the U.S. is about to reach 700,000 deaths from Covid-19, and the last 100,000 people to die passed away months after vaccines were American adults, and the majority of unvaccinated Americans have died in recent months, they also analyzed that the people who died in the last three and a half months for the spreading widely 'Delta variant' in the South lagging in vaccinations. And, recently after long lockdowns in Purba Bardhaman, West Bengal, India (Figure 1), only two days (11th-September 2020 to 3rd-October 2021) showed that the total COVID-19 positive cases are 3339 to 39871, the total number of discharge cases were 2740 to 39136, the total number of COVID-19 death is 45 to 477, rate of recovery was 82.062% to 98.15% respectively, and rate of mortality was 1.34% to 1.20%, and the distribution of COVID positive patient in Burdwan Municipality was 11 to 10. So, it is an urgent need to find out policy-initiative, cheap, non-phytotoxic, and non-pollutant strategies to develop future support and treatments of COVID-19.

On the other hand, food production in midday-meal kitchen-gardens and agriculture significantly reduces due to different-pests-attacks. Though chemical pesticides are the most potent means of control, they are costly with badly impact on the environment, global health-ecology, medical-pharmaceutical-education, clinical-research, agriculture-forestry-horticulture-environment, and wildlife-conservation-biodiversity, etc. [3-28]. So, to move forward, it will need new and more efficient innovative solutions, technologies, and products or systems to fulfill the above-mentioned requirements by improving 'Science, Technology, Communication and Application-Issues' by which 'World will retain in old forms again'.



Daily Press Briefing
Purbabardhaman
Date: 11/09/2020 (Up to 5.00 P.M.)
(Report to by send by 7.00 P.M Daily)

Part – I: Related to COVID-19

i)	**Total No. of COVID Positive Patients found on the day of reporting ***	:	**68**
ii)	Total no of COVID positive patients**	:	**3339**
iii)	Total no of active patients as on today***	:	**554**
iv)	Total no of discharged cases	:	**2740**
v)	Total no of COVID death recorded	:	**45**
•	**Quarantine status :**		
vi)	Total no of persons under institutional quarantine	:	**538**
vii)	Total no of persons under house quarantine	:	**745**
viii)	Total no of persons under quarantine from Maharashtra, Delhi, Gujarat, Tamil Nadu & M.P.	:	**733**
ix)	Total no of persons under quarantine from other state of India	:	**27**
x)	Total no of persons relaxed from institutional quarantine	:	**192**
•	**Testing status :**		
xi)	Total no of Sample collected up to 10.09.2020	:	**74830**
xii)	Total no of Sample tested	:	**72899**
xiii)	Total no of Positive cases	:	**2149 (+41 repeat +ve)**
xiv)	Total no of negative Cases	:	**70091(+618spillage/rejected)**
•	**Containment Zone status :**		
xv)	Total no of Containment Zone as on today	:	**457**
xvi)	Total no of containment withdrawn	:	**1259**
•	**Analysis of Positive Persons Details : On date – Positive-**		
xvii)	Total No. of Migrant (Other State + Other Dist. of WB):	:	**2**
xviii)	No. of Persons in Safe House:	:	**7**
xix)	No. of Person in Covid Hospital:	:	**11**
xx)	No. of Persons in Home Isolations:	:	**50**
Analysis on COVID-19 +Ve Cases :			
xxi)	Rate of Recovery# (Percentage)	:	**82.06**
xxii)	Rate of Mortality# (Percentage)	:	**1.34**

Report on Sample Testing:			
xxiii)	Antigen Test	:	**1141**
xxiv)	RT-PCR Test	:	**758**
xiv)	Test Result within 24 Hrs.	:	**1141 (RAT-114 + RTPCR- 0)**

#On Total Positive Case

Part- II:

Distribution of COVID Positive Cases found on 11/09/2020

[Burdwan Municipality: 11, Dainhat Municipality: 01, Katwa Municipallity: 02, Kalna Municipality: 09, Memari Municipality: 01, Aushgram-I: 01, Aushgram-II: 03, Bhatar: 02, Burdwan-I: 03, Burdwan-II: 07, Galsi-II: 03, Jamalpur: 01, Kalna-I: 03, Kalna-II: 03, Katwa-I: 01, Khandoghosh:01, Memari-I: 03, Memari-II: 01, Manteswar: 02, Mongolkote: 01, Purbasthali-I: 02, Purbasthali-II: 05, Raina-II: 02]

Part- III:

Analysis on COVID +Ve Cases on 11.09.2020		*COVID Positive as on today	**Total Positive Cases
Type	Symptomatic	11	443
	Asymptomatic	57	2896
Total		68	3339
Contact Analysis	Primary Contact	15	510
	Travel from High Burden Dist. of W.B.	2	170
	Travel from Other State	0	405
	No Travel History	51	2254
Total		68	3339

Daily Press Briefing
Purba Bardhaman
Date: 03/10/2021 (Up to 5.00 P.M.)
(Report to be send by 7.00 P.M Daily)

Part – I: Related to COVID-19

i)	**Total No. of COVID Positive Patients found on the day of reporting ***	:	**23**
ii)	Total no of COVID positive patients**	:	**39871**
iii)	Total no of active patients as on today***	:	**259**
iv)	Total no of discharged cases	:	**39135**
v)	Total no of COVID death recorded	:	**477**
vi)	Rate of Recovery# (Percentage)		**98.15**
vii)	Rate of Mortality# (Percentage)		**1.20**
viii)	Current Positivity Rate (last 7 days)# (Percentage)		**0.97**
•	**Testing status : RTPCR + RAT**		
xi)	Total no of Sample collected	:	**750670**
xii)	Total no of Sample tested	:	**750157**
xiii)	Total no of Positive cases	:	**33970 (+53 repeat +ve)**
xiv)	Total no of negative Cases	:	**716197**
•	**Containment Zone status :**		
xv)	Total no of Containment Zone as on today	:	
xvi)	Total no of containment withdrawn	:	
•	**Analysis of Positive Persons Details : On date – Positive-**		
xvii)	Total No. of Migrant (Other State + Other Dist. of WB):	:	**00**
xviii)	No. of Persons in Safe House:	:	**00**
xix)	No. of Person in Covid Hospital:	:	**01**
xx)	No. of Persons in Home Isolations:	:	**22**
Report on Sample Collection and Testing(On Date):			
xxiii)	Antigen Test	:	**477**
xxiv)	RT-PCR Test	:	**215**
xiv)	Test Result within 24 Hrs.	:	**578 (RAT-477+ RTPCR-101)**

Part- II:

Distribution of COVID Positive Cases found on 03/10/2021

Aushgram-I	0	Galsi-II	0	Ketugram-I	0	Mongolkote	0	Burdwan Municipality	10
Aushgram-II	0	Jamalpur	0	Ketugram-II	0	Purbasthali-I	0	Dainhat Municipality	0
Bhatar	1	Kalna-I	3	Khandoghosh	0	Purbasthali-II	0	Guskara Municipality	0
Burdwan-I	0	Kalna-II	0	Manteswar	0	Raina-I	0	Kalna Municipality	0
Burdwan-II	6	Katwa-I	0	Memari-I	0	Raina-II	0	Katwa Municipality	0
Galsi-I	0	Katwa-II	0	Memari-II	0	Other District	3	Memari Municipality	0

Analysis on COVID +Ve Cases on 03/10/2021		*COVID Positive as on today	**Total Positive Cases
Type	Symptomatic	01	4221
	Asymptomatic	22	35650
Total		23	39871
Contact Analysis	Primary Contact	00	1584
	Travel from High Burden Dist. of W.B.	00	217
	Travel from Other State	00	435
	No Travel History	23	37635
Total		23	39871

Figure 1: COVID-19 report of the United States, seven-day average in 1st-October 2021 in The New York Times, and of Purba Bardhaman District from 11th-September 2020 to 3rd-October 2021.

Primarily it has been observed, "The wild 'Owls' becomes the 'Social Guards, Bio-Indicator, and Social Vaccine' against COVID-19 by consuming especially Coronavirus-carrier wild bats and mongoose, enriching community health, health-risk-services, healthy-lifestyle, wildlife-conservation, agriculture, forestry, horticulture, science, technology, and communication-application-issues, socioeconomic, joyful learning environment, communities-and-health-ecology, food chain relationships issues, and contribute to sustainable pisciculture, and kitchen garden management, micro-and macro-climate issues, where it is mentioned that the wild bats secrets of immunity confirm the clues of treatment against various mutant-Coronavirus with developing the policy also, and arouse the interest of students about conservation of biodiversity" [10,11,36-39]. And recently in 'Science', a cave in a mountain in Laos not far from the one shown here is home to bats infected with the closest coronavirus to SARS-CoV-2 yet, and the new viruses, the SARS-CoV-3, show for the first time that a key feature of the pandemic virus exists in the wild, that viruses genetic sequence to SARS-CoV-2 up to 96.8% identical, using its surface protein, spike, angiotensin-converting enzyme 2(ACE2) for initiating an infection, and may cause 'Future Pandemic' due to evolution, several decades separate these bat viruses remain inactive [40].

So, to tackle and overcome both the situations, the present studies, our best endeavor is to confirm and focus on the observations on the naturally-growing "Wildlife-Conservation-Project of 'Bats-Breeding' in the more than 210-year-old, Heritage-School, Burdwan-Raj-Collegiate-School, is considered for the behaviors and activities of bats, which may have acted as an important preventive COVID-19 family vaccine, with the improvement of the Science and Technology Communications by joyful school environment, and economic implications for wildlife conservations, and agriculture by better crop quality and production for a midday meal in future. The results would be more realistic in terms of the potentiality of the wild bat, use as potential Science and Technology Communication Social-Vaccine-Bio-Indicator, or–Bio-Monitor or-Environment-Friendly Predator Mammals, in controlling numerous pests, unknown threaten microorganism like novel Coronavirus, the COVID-19, as well as ecosystem. Our main aim is to confirm and investigate new and more potential solutions, technologies, systems or products and it has to improve "Science and Technology Communication Social-Community-Vaccine against COVID-19" forming joyful school as well as community environment, and fulfill its food and nutrition requirement which indirectly -influence or –indicate any kinds of thresholds or natural calamities for the climate change and resource productive socio-economies enriching the quality of midday meal as well as a joyful educational environment.

MATERIALS AND METHODS

Location and Weather

The experiment was carried out at the more than 210-year-old, Heritage-School, Burdwan-Raj-Collegiate-School (HS) building and campus, Nutanganj, Raiganj, Burdwan Municipality, Purba Bardhaman-713102, West Bengal, India, (**Plate 1**), where the temperature was 22±5^{o}C, relative humidity was 75±5%, is situated near the Damodar and Banka river, and is surrounded by ponds, forest, different trees, park, garden, playground, different storehouse, rice mill, markets, agriculture-horticulture-land, brave-yard, wildlife sanctuary, masjid, temples, etc. forming the 'Location-Wise an Ideal Place' for keeping-and-caring of 'Wild-Bats', with the average rainfall was 150 millimeters. The school campus prevail the different old- and tall-tree, nutritional kitchen garden with a midday meal, exhibited an enriched faunal diversity comprising small mammals, pigeons, different small birds, reptiles, toads, and insects [10,11,36-39].

Plate 1: Activities of wild bats in the COVID-19 periods at the Burdwan Raj Collegiate School (HS)

Duration and Habitat

The observation of experiment was conducted for 18 months, from 18th-March 2020 to 3rd-October 2021 in the 26.5 ft height ceiling of the 11-big rooms, big gymnasium, big core-door, veranda, and big trees in the large campus, and bats make their habitat, homes (roosts) in a variety of different structures in the cracks in wooden bar and buildings, rail lines like very old wooden-ceiling, trees, and even the attic of the building (**Plate 1**). The bats were observed every day thrice or more. All the data were counted for statistical analysis by the analysis of variance (ANOVA) [10,11,36-39].

Activity of NGO

The Burdwan Green Haunter and Students' Goal, NGO, forms four main activity-groups; core group, working group, advisory group, and social media group, guided and guided by Dr. Subhas Chandra Datta, and coordinated by the secretary, Mr. Rakesh Khan, M.A., B.Ed. (Gold Medalist), and president, Mr. Subhendu Bose, Administrator of B.Ed. College) [10,11,36-39].

- Core Group- has 22-members with 10-subgroup, decision-making, and leading-working group.
- Working Group- has 210-members with 11-subgroup, engaged in different social activities.
- Advisory Group- has 10-members in different disciplines like academicians, administrators, doctors, teachers, scientists, business personalities, engineers, accountant, social reformer, reporter, government employee, and entrepreneur with different-subgroup, give advice and problem solve, if necessary.
- Social-media Group- has more than 1300 members, followers 21,000, engaged mainly for publicity.

Counting

A team of Divisional Forest Officers, Burdwan Division, Bardhaman-713104, West Bengal, India, helped to the proper count of wild bats in trees as well as in the building (Plate1). The direct counting technique is used for counting bats roosting in buildings but is difficult to count bats inside trees. Direct counts of clusters of bats in the day and a direct headcount are made in the night by torchlight, and binoculars are needed for the bats 26.5ft-roosting-high. And surface area estimates are easy and suitable for estimating numbers of bats roosting in large clusters of wild bats has been estimated in 1000s bats/m^2 [41].

Maintenance of Records

All the data were maintained for record and were counted for statistical analysis by the analysis of variance (ANOVA) [10,11,36-39]. The survey was randomly recorded by the young students Non-Governmental-Organization (NGO) named "Burdwan-Green-Haunter and Students'-Goal", at ward no. 13 and adjacent surrounding total area of the Burdwan Municipality, Bardhaman, Purba Bardhaman District, India. Total families were 685 and also the total population was 3425, and therefore the activities were conducted and measured from the 18th-March2020 to 3rd-October 2021 and up-to-date [10,11,36-39,41].

Observation on Different Behaviors

Nesting and hunting behavior, sound-producing behaviors, wild behavior, and social behaviors, as well as bio-indicator behaviors, has been observed, and the relationship with other bats, pigeons, small birds, dogs, cats, visitors as well as staff, has also been observed, and the 'Bardhaman Fire Brigade Service-Team' helped to conduct examination on 26th-September 2021 (Sunday) without fear from bats[10,11,36-39,41].

Observation of Human Interactions

Human interactions with bat-wildlife are observed and recorded of interactions, extinction and reduction, uncountable human deaths and economic losses, which may be positive or negative, and common people compete with wildlife for different disciplinary perspectives to address human-wildlife conservation conflict and coexistence outcomes [10,11,36-39,41,42].

Observations

Different behavior and attitude of the bats, students, teachers, guardians, communities, photographers, and different types of visitors have been observed by NGO-direct physical access, and every one the information were counted for statistical analysis by analysis of variance (ANOVA).

Science and Technology Communication

The activity of the community, different visitors and media personnel, campaign or aware or make the news or publications regarding importance is recorded [3-19,22-28,36-39].

RESULTS

Different Activities and Behaviors

Table 1 shows the relation, feelings, and activities to wild bats in the school during COVID-19 periods with visitors at the Burdwan Raj Collegiate School (HS) from 18th-March2020 to 3rd-October 2021 (18 months) up-to-date, and observation of the infection or re-infection (before and during COVID-19) of coronavirus-2, and all the data were counted for the statistical analysis by the analysis of variance ANOVA ($P \leq 0.01$). A large number of

Table 1: Relation, feelings and activities to wild bats in the school during COVID-19 periods with visitor

Location: Burdwan Raj Collegiate School (HS), Nutanganj, Burdwan Municipality, Duration: 18th-March2020 to 3rd-October 2021								
Samples in School (Living)	**Visitor Before COVID-19 (number)**	**Visitor After COVID-19 (number)**	**Behavior Before COVID-19**	**Special Behavior (Before Police Exam on 26th-September 2021)**			**Relationship During COVID-19**	
				Forcefully Application of			**Intraspecific**	**Interspecific**
				Water Spray	**Bursting Crackers**	**Fire Smog**		
Bats	125cx±5	8 365ay±25	Normal Social Flocking	Temporary Flew Away	Frighten Temporary Flew Away	Frighten Flew Away	Normal Social Alert	Alert Aggressive Fighting
Pigeons	1287ax±11	16dy±2	Normal Social	Temporary Flew Away	Frighten Temporary Flew Away	Just Flew Away	Abnormal Curious	Abnormal Frighten Avoiding
Others Animals (Birds, Squirrels, Cats, Monkeys, etc.)	55dx±5	193by±7	Normal Alert	Hide Ran away	Frighten Temporary Leave	Temporary Leave	Normal Curious Alert	Curious Caucus Alert
Communities (Students, Staff & Guest, etc.)	685bx±10	37cy±3	Normal Social	Dislike	Dislike Irritation	Dislike Disturb	Frighten Curious Alert	Curious Frighten Alert

'**a,b,c..'**- different small letters in a column, and '**x,y**' different small letters in a row show significant difference by the analysis of variance 'ANOVA' ($P<0.01$).

Pigeons and communities (students, teachers, staff, and guests) visitors came or resided before COVID-19 in comparison to bats and other animals, and bats only live in the roof of the gymnasium hall from a very long time, and the highest number of pigeons were resided but reversed in the COVID-19 period, and the highest numbers of bats were present during COVID-19 to up-to-date (Plate 1). The bats, pigeons, different animals including communities behaved normally and socially and sometimes alert in the case of different animals. During COVID-19, the bats only behaved normally and socially with alerting in the intra specific relationship, though other animals behaved normally but curious and alerting, and the pigeons behaved abnormally with curiosity, and the communities were always frightened, curious, and alert. Inetrspecific behaviors of bats were alerting, aggressive, and fighting, but in the case of pigeons were 'Abnormal Frighten Avoiding', other animals were 'Curious Caucus Alert', and communities were always 'Caucus, Frighten and Alerting' against COVID-19. Special behaviors (Plate 1) were observed during the preparation of the 'Police Recruitment Exam on 26th-August 2021' for taking some measures (3 types) especially for temporary displacement of bats by forcefully application of; (i) Water Spray, (ii) Bursting Crackers, and (iii) Fire Smog. In the 'Water Spray', bats and pigeons were temporarily flew away from their home, other animals (Birds, Squirrels, Cats, Dogs, Monkeys, etc.) were hide and ran away, and communities were disliked it. In the 'Bursting Crackers', bats and pigeons were frightened and temporarily flew away from their school, and other animals were frightened, and temporarily left the place, and communities were disliked it and became irritated. In the 'Fire Smog', bats

were frightened and flew away from their school campus for some days, pigeons just flew away from the nest, other animals temporarily leave the place, and communities were disliked it and became disturbed (**Plate 1 and Table 1**).

Table 2: Social family-immunization effects of wild bat against COVID-19 among various communities

Average Family Age Groups (years)	Visited Area: Burdwan Raj Collegiate School (HS), Nutanganj, Burdwan Municipality: 18th-March2020 to 3rd-October 2021 (18 months)						
	Average Number of Family Visited	Average Number of Family Members	Average COVID-19 Active Patients	Average COVID-19 Passive Patients	Average Home Quarantine	Average Number of Recovery	Remarks
Senior: (60-99)	171.25a ±00.02	231.18ax ±00.02	07.00ay ±00.04	156.82az ±00.26	154.42az ±00.12	157.97az ±00.11	Died only aged and co morbid heart and diabetic patient
Middle: (20-59)	255.87b ±00.01	767.61cx ±00.17	04.00by ±00.02	248.23bz ±00.07	251.22bz ±00.11	254.98bz ±00.14	One assistant teacher of School died due to heart attack
Early: (00-19)	257.89b ±00.03	644.73bx ±00.11	00.00cy ±00.01	397.97cz ±00.11	396.03cz ±00.01	397.01cz ±00.16	No mortality occur due to increase effective natural immunity
Total: (01-99)	685	1644	11	803	802	810	Potential social natural immunization results due to effective natural immunity

'**a,b,c'**- different small letters in a column, and '**x,y,z**' different small letters in a row show significant difference by the analysis of variance 'ANOVA' (P<0.01).

Social Spectrum and Frequency of Immunization

Table 2 shows the social family-immunization effects of wild bat against COVID-19 among various communities surrounding the Burdwan Raj Collegiate School (HS), Nutanganj, Burdwan Municipality, from 18th-March2020 to 3rd-October 2021 (18 months) up-to-date, and observation of the infection or re-infection (before and after COVID-19 vaccines) of coronavirus-2, and all the data were counted for the statistical analysis by the analysis of variance ANOVA (P≤0.01). The NGO-"Burdwan-Green-Haunter and Students'-Goal" visited and counted at randomly in Bardhaman Town were; the average number of 685 families, the average number of 1644 family members, the average number of 11 COVID-19 active (o.67%) patients, the average number of 803 COVID-19 passive (48.84%) patients, the average number of 802 home quarantine (98.53%), and the average number of 810 patient recoveries (99.51%) from COVID-19. And out of an average number of 814 COVID-19 positive patients, an average number of 12 patients (1.47%) admitted to the Burdwan Medical College and Hospital, Bardhaman, an average number of 8 patients (99.51%) recovery from COVID-19, and an average number of 4 patients (0.24%) died due to senior (60-99) aged and comorbid, heart and a diabetic patient with 'Multisystem-Inflammatory-Syndrome (MIS-C)' , and no mortality occurred below 60 middle age, adolescent and children age group (Table 2).

DISCUSSION

Activities and General Behaviors

Before the COVID-19 pandemic as well as lockdown from18th-March2020, the coexistence of a large number of pigeons, students, teachers, staff, different communities, guests, and visitors, were remarkably occurred in comparison to bats and other animals like different birds, squirrels, cats, monkeys, dogs, etc., and owls are also the regular frequenters of this tree, and the highest number of (more than one thousand) pigeons were resided peacefully showing normal social behaviors, due to everything is normal, and normal situation, enriched midday meal, and they always manage everything and feel like home, the Burdwan Raj Collegiate School as well as campus, forming the joyful environment. But reversed in the COVID-19 periods, and the highest numbers of bats, more than 8,000, were present during COVID-19 to up-to-date, due to; the appropriate comfortable solitary resident home, the pigeons and other animals like dogs, cats, squirrels, etc., left the school for the deficiency of food, and protection, and the aggressive fighting noisy behavior among the bats, though they are extremely social, the "Human-Wildlife Conflict and Coexistence" [41-45]. The Hon'ble Nature-lover Headmaster, Mr. Subrata Mishra, double M.A. in Literatures (English & Bengali), interested assistant teachers, and the guard family members residing on the campus for protection of the heritage school, have informed that most of the wilds insectivores' fruits bats have come from the trees of brave-yard named 'Pirbaharam' campus, and in the pigeons have behaved as 'Abnormal Frighten Avoiding', and the majority of them have left the nest of school, and other animals became 'Curious Caucus Alert', and

communities were always ‘Caucus, Frighten and Alerting’ against COVID-19. They act as main pollinators among the flowering trees and can eat the insects as his body weight that prey on the plants of the campus as well as the surrounding of the major forage part of Burdwan Municipality enriching the environment, agriculture, horticulture, plant protections, and biodiversity.

Special Behaviors

Special behaviors were seen during the preparation of the ‘Police Recruitment Exam on 26th-August 2021’ for taking some artificial measures (3 types) especially for temporary displacement of bats by forcefully application of; (i) Water Spray, (ii) Bursting Crackers, and (iii) Fire Smog. They return shortly due to safety shelters from predators, protection from fluctuations in weather, and seclusion for rearing the young, and due to availability of foods. It is not only badly impacted on the social behaviors of the bat but also affects the pigeons and other different animals including communities, and it should be resisted for the benefit of society because they support valuable contribution to the environment, the "ecologically indispensable", and badly impact on the “Family-Health-Care, Health-Risk-Services, Healthy-Lifestyle, Clinical-Research, Education, and Enriched Wildlife-Conservation, Agriculture-Forestry-Biodiversity-Environments, Socioeconomic, and Science-Technology-Communication, Application-Issues with Joyful Learning Environment with Human-Health-Ecology, and Food-Chain-Relationships, and Community as Well as Families’-Health-Awareness-Development” [5,8,9,21,29,36-50].

Social Behavior

The wild bats always gives positive responses for the relationship or interaction or attitude among the parent's bats, among the babies of bats, pigeons, students, teachers, communities, and closely related staff specially headmaster and guards family members, and bats give negative responses to pigeons, other birds, cats, dogs, photographers, visitors, and media personnel [5,8,9,21,29,36-50].

In Social Spectrum and Frequency of Immunization

The social family or community immunization effects of wild bat against COVID-19 among different communities surrounding the Burdwan Raj Collegiate School (HS), Nutanganj, Burdwan Municipality, from 18th-March2020 to 3rd-October 2021 (18 months) up-to-date, and observation of the infection or re-infection (before and after COVID-19 vaccines) of coronavirus-2 [1,2], were very high because out of 98.53% home quarantine-patients, and 99.51% recovered from COVID-19 up-to-date, and 0.24% COVID-19 patients mortality occurred in the Burdwan Municipality due to comorbid, heart and a diabetic patient with ‘Multisystem-Inflammatory-Syndrome (MIS-C)’. Recently it is observed that the wild bats are natural reservoirs of similar kinds of coronaviruses [29], and they act as asymptomatic carriers of COVID-19 disease-causing pathogens in humans and other mammals, with diverse ecological niches and colonizes most of the planet, and SARS-CoV-2 found in a cave in Laos yield new clues about pandemic’s origins that were infected with viruses up to 96.8% identical in genetic sequence to SARS-CoV-2 through bat anal swabs, and the SARS-CoV-2 of bats use its surface protein, spike, to dock onto human cellular receptors known as angiotensin-converting enzyme 2(ACE2) and initiate an infection, and the ‘Human-Wildlife Conflict and Coexistence also’ [29,40-43]. The coronavirus can spread large area of the Burdwan Municipality because bats can travel flocking and interacting with different animals and humans around 50 miles per night, and can get back to their roosting place, and some bats are extremely social in respect of infection, bats can live a pretty long time, up to 40 years [43]. And the bats can resist coronaviruses holds substantial promise not just for infections with SARS-CoV-2, but will “better prepare us for the following epidemic or pandemic”, though bats can infect one another with SARS-CoV-2 they show no clinical effects nor show the identical issues within the lungs that impact humans so badly, and bats can help in immunomodulatory treatment options for COVID-19 against man by the immunopathology of SARS-CoV-2 infection, and it can provide pivotal guidance to researchers and clinicians developing and administering potentially life-saving immunomodulatory therapies, and the decisions making therapeutic for selecting the essential potential immunotherapeutic agents and timing for application to prevent morbidity and mortality of COVID-19, and also the science immunology are responsible of bats’ responses to SARS-CoV-2 which can be the key factors for the “How and When to Best Use the Existing Therapies for COVID-19 for the Develop of New Treatments”, and also the way the virus that has caused this pandemic wreaks havoc on the human system, and there remains an urgent “need for effective therapies, a minimum of partly because of the emergence of mutations”, and it will be understandable for ‘bats resist COVID-19 could inform human treatments’ [44,45].

Social Natural Booster Family Vaccine Immunization Against COVID-19

The wild bats, natural reservoirs of coronaviruses, apparently acts as a “Social Environment Friendly Visitor Species of the Family as well as in the Community Involving the Food Chain Relationships in the Burdwan Municipality” [5,8,9,21,29,36-48], spreading different types of new virus including non-expressive infective SARS-CoV-2 (or may be SARS-CoV-3 for oldest placed), through their anal swabs travel around 50 miles per night from the school, and return home

after infecting its surface protein, spike, to dock onto human cellular receptors known as angiotensin-converting enzyme 2(ACE2) and initiate an infection of different families and communities of the society, and increase the natural immunity of human beings of different-age groups, and different domestic as well as migratory animals, acting as "Social Natural Booster Family Vaccine Immunization Against COVID-19" , and it may not only prevent the various mutant variant causing typical or long-haul COVID-19 but also may prevent 'Future Epidemic or Pandemic' due to exists pandemic virus in the wild bats, that update in pipeline of 'Social COVID Vaccine Boosters', medicated vaccines design and development strategies, or drugs for the managements with future 'Efficacy and Safety' treatment options of reality or dream enriching 'Human–Wildlife Conflict and Coexistence', preventing the impact of COVID-19 pandemic on food security, agriculture, and livelihoods, and the bats and men is opening the path of mmunomodulatory treatment options for COVID-19, acting as "21st-Century Preventive Non-Medical-COVID19-Students-NGO- Model" preventing deaths and social anxiety [1,2,20,21,25,29-50].

Biodiversity Conservation

The biodiversity of the campus of Burdwan Raj Collegiate School (HS), is enriched 'Complex Wild Ecosystem' where students, staffs, communities, visitors, and birds and animals like mynah, dove, magpie, drongo, oriole, bulbul, crow, cuckoo, babbler, kingfisher, woodpecker, migratory birds, squirrel, bats, tailor birds, snake, mongoose, mice, frogs, cats, stray dogs, different types of insects, monkeys, etc. are amicably co-existing with wild bats, and it is also helped to the sustainable reopening of school with joyful learning environments and is also acquired natural immunity from wild bats, and prevent pandemic deaths and social anxiety from Covid [10,11,36-50].

Science Technology Communication Application Issues

The activity of teachers, students, teachers, staffs, guards, community, photographers, visitors, and media personnel campaign, arrange workshops and seminars, make news and publish, the importance of wild bats in different national- and local- audiovisual media (TV channels), different social media, different -national and -local newspaper, and different -national and –international journals, and aware the "Bats Act as a Natural-Booster-Family-Vaccine-Immunization Against COVID-19 Providing Preventive Family-Health-Care Health-Risk-Services Healthy-Lifestyle-Enriched-Wildlife-Conservation-Agriculture-Forestry-Environment--Science-Technology-Communication-Application-Issues".

Future Research

The wild bats may be "Potential Policy Developer Family-Based-Social-Natural-Booster-Community-Vaccine COVID 19 Epidemic-Models Against Future SARS-CoV-3 (Coronavirus-3) Crisis Achieved Sustainable Development Socio-Economic Welfare Science Technology Innovations Application Issues", focusing on methods of drug and clinical research, and technology development innovation for larger green-socio-economic-welfare, supported the theme "Vision 2040" that might help policymakers, solving any future virus-induced crisis of epidemic or pandemic enriching natural resources with cost-effective treatment methods, and the world will be retained in old form [50].

CONCLUSIONS

The bats not only control the different pests in agriculture, horticulture, and pisciculture, etc., increasing food production, but also confirms and plays a vital role in preventing the high rate of morbidity and mortality, showing the "Wild-Bats Act as a Natural-Booster-Community-Vaccine-Immunization Against COVID-19", and developing and administering potentially life-saving immunomodulator therapies by improving natural immunities, and provides "Preventive Family Health Care, Health-Risk-Services, Healthy-Lifestyle, Clinical-Research-Education and Enriched Wildlife-Biodiversity-Conservation, Agriculture-Forestry-Environments, Socioeconomic, Medical-Pharmaceutical, and Science-Technology-Communication Application Issues with Joyful Learning Environment with Human-Health-Ecology, and Food-Chain-Relationships, and Community as Well as Families' Health Awareness Development Once Again". They are also opening a path of more future research and communication, for the betterment of the society benefitting global humanity by advancing innovations in the fields of scientific and clinical research, and needs for such therapies in COVID-19, especially for the emergence of variants concern that may pose new challenges for medicated vaccines and neutralizing antibodies for the future epidemic enhancing the success of clinical trials for therapeutics, and the recommendation for multiple immune targets as candidates for the treatment, prevention and management of COVID-19 like various variant virus diseases also.

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Conflicts of Interest Statement

The author declared that he has no conflict of interest regarding the research work.

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