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Ethnobotanic Survey of Aids Opportunistic Infections in the Fatick and Kaolack District (Senegal)

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Authors' contributions

This work was carried out in collaboration among all authors. Author KD designed thé study, performed the statistical analysis and wrote the protocol and the first draft of the manuscript. Author WD managed the analyses of the study. Author ADF managed the analyses of the study. Authors SIMD, AIM and EHOF performed the statistical analysis. Author ADF managed the literature searches and approved the final corrections.

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ABSTRACT

HIV / AIDS infection is characterized by the reduction of the body's defenses favoring the occurrence "opportunistic" infections, as furuncle, encephalitis and tuberculosis etc. Thus, to fight against this virus, antiretrovirals are used.

The Kaolack and Fatick District have a prevalence rate (2.1%) above the national average of 0.7%. The aim of this study is to inventory the plants used against the treatment of opportunistic HIV / AIDS diseases because the populations often resort to phytotherapy. It is in this sense that a survey of twenty seven herbalists, Seventeen tradipraticians and eleven resource persons was conducted to identify the plants used in the management of opportunistic AIDS diseases. One hundred fifteen plants could be identified and divided into ninety seven genera and forty seven families. Some species have been mentioned very frequently and in many diseases. These are: *Pterocarpus erinaceus* (60%), *Acacia nilotica* (58.1%), *Ficus thonningii* (54.5%), *Detarium microcarpum* (52.7%), *Guiera senegalensis* (45.4%), *Lepisanthes senegalensis* (36,4%), *Adansonia digitata L.* (31%) *etc.* Leaves and barks constituted the greatest use in the form of decocted, macerated, for drinking,

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inhalating, or fumigation, etc. The result of this study was shown that medicinal plants are promising in managing HIV/AIDS related diseases. Further investigations are needed to explore the bioactive compounds of these herbal medicines, aimed at exploring the bioactive compounds that can be developed into anti-HIV drugs.

Keywords: AIDS; ethnobotanic; fatick; kaolack; opportunistic infections; plants.

1. INTRODUCTION

The medical world was marked in the End of twentieth century by the discovery of a fatal viral infection, the AIDS named « Acquired Immuno Deficiency Syndrome» by scientists. In 1999, WHO class AIDS pandemic. Infections caused by human immunodeficiency virus (HIV) is today a worldwide public health problem and their psychosocial and economic consequences are of increasing concern [1]. The virus attacks a specific type of white blood cells known as T-lymphocytes which are critical to the normal functioning of the human immune system that defends the body against all types of illnesses. The consequences of a weak immune system in HIV/AIDS include the manifestations of opportunistic infections of which skin diseases form a large portion [2]. Opportunistic infections involve multiple systems of the body such as immune, gastrointestinal, genitourinary, endocrine, dermatological and nervous system [3]. In 2011, there were thirty-four (34) million people living with virus (PLHIV) in the world, of which twenty-three point five (23.5) million were in sub-Saharan [4].

In Sub-Saharan Africa, traditional healers treat and manage a large number of people with HIV/AIDS. Health facilities are overburdened by the increasing demand for care of HIV/AIDS patients [5,6]. medicinal plants play a crucial role of providing remedy and also provides health care by taking care of people living with HIV/ AIDS [7].

AIDS and other opportunistic infections exert the greatest limitations for health care in the world by causing serious debility, morbidity and mortality in the affected population [8,9].

It is also regarded as the major factor behind population decrease in the last 10 years in the overall life expectancy in Sub-Saharan Africa [10,11].

Senegal has a low HIV prevalence (0.7%) [12] capitalizes a significant success in preventing AIDS and aims to maintain these assets with the Senegalese Initiative on Antiretroviral Access (ISAARV) establishment since 1998 making Senegal the first African country to offer a therapeutic management through a public program strengthened in 2003 by free antiretroviral (ARV). AIDS has become as a result of antiretroviral therapy, a chronic disease that ends in death of the infected organism, as a result of opportunistic diseases. These opportunistic infections are mostly responsible for the high rates of disease mortality. They are associated with HIV because of significant immune deficiency.

So fighting AIDS becomes bouting against these opportunistic deseases for a better overall management of this infection. However, the treatments established by the pharmaceutical industry are too expensive for the majority of Africans and are, moreover, not available everywhere.So it is possible to use the medicinal plants that are found in abundance in Africa.

Medicinal plants used for treating and managing HIV/AIDS opportunistic diseases in sub-Saharan Africa are an integral part of a culturally accepted and holistic health care system that has been in existence for several generations. Therefore, traditional medicines are possible sources of complementary and alternative medicines for HIV/AIDS opportunistic diseases [13].

These are the single we were interested in dealing with the opportunistic diseases of AIDS by plants by doing an investigation in the District of Fatick and Kaolack; these two District are crossroads District very affected by the AIDS pandemic (2.1%) because of the density of the population and its movements across the border countries. The objective of this study is therefore all the medicinal plants used to treat these opportunistic diseases.

2. MATERIALS AND METHOD

2.1 Study Area

The survey was conducted in two District. The Kaolack District has an area of 5357 km^2, lies at

14°30' N Latitude and 16°30' W Longitude with a population of 990745 inhabitants. It has a Sudano-Sahelian climate with high temperatures from April to July (35° - 40°C) and a total annual rainfall of 630 mm / year [12].

The Fatick District has an area of 6685 km^2, lies at 14°21' N Latitude and 16°35' W Longitude with a population of 761713 inhabitants. It has a tropical Sudanian-type climate, marked by a Sudanese- Sahelian variant and a Sudano-Sahelian variant and a total annual rainfall of 611 mm / year [12].

Below representative map of the survey area (Fig. 1).

2.2 Vegetation Description

The Kaolack relief is essentially flat with three types of grounds: tropical ferruginous grounds, hydromorphic grounds and halomorphic grounds. The vegetation is very various and includes a shrub Savannah in the North and a more or less wooded Savannah to the South and South-East. The District of Fatick is covered by a large plain. It has a forest area composed of 14 classified forests covering an area of 87,577 ha, a ranking rate of 13%.

Kaolack District has a very varied vegetation and includes a shrub Savannah in the North and a more or less wooded Savannah to the South and South East. The fauna is essentially composed of wild animals with aquatic and terrestrial hairs and feathers. The hydrographic network consists of the Saloum Inlet and tributaries of the Gambia River (Baobolong and Miniminiyang Bolong) [12]. The Fatick District is immersed in a natural environment with a tropical Sudanian climate, a Sudanese Sahelian variant and a Sudano-Sahelian variant. It is also influenced by the maritime climate on the coastal part of the departments of Foundiougne and Fatick. It has a Sudano-Sahelian climate [12].

2.3 Socio-economic Conditions

These two Districts are encountering alarming socio-economic conditions due to rural exodus, rampant poverty, and rarity of rainfall, as agriculture is the main source of work. As a result, the living conditions are becoming more and more difficult and the rural exodus is very accentuated.

2.4 Study Design

This study was conducted using a pre-established questionnaire. It covered the period from February 2013 to April 2013. The majority ethnicities encountered were Serer, Wolof, Peulh.

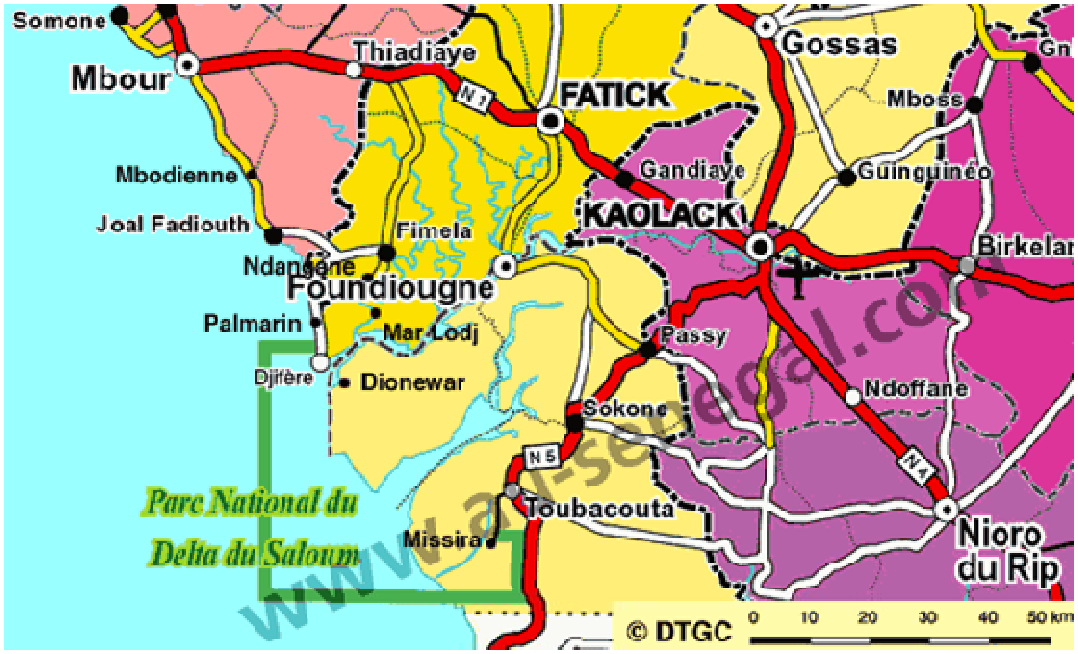

Fig. 1. Survey localities area

2.5 Population of the Study

The study population was composed of twenty-seven (27) herbalists, seventeen (17) traditional healers, and eleven (11) resource persons with traditional medical knowledge.

2.6 Collection, Identification and Classification

The unknown species of our interviews had been collected and identified in the laboratory of Botany of Cheikh Anta Diop University by Pr Diatta (Botany Specialist). The classification was made using and the new classification APG III [14], the books of Eklu-Natey [15] and Kerharho [16].

2.7 Statitiscal Analysis

The data collected were analyzed using both Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 3. Frequency and percentage tables were generated to summarize results for discussion.

3. RESULTS AND DISCUSSION

A total of 115 plant species from 97 genera and 47 families were identified as used in the management of opportunistic AIDS diseases. The families, botanical names, local names, common names, Affections, used plants and Preparations (application) are given in Table 1 classified according to [14,15,16].

Some families are more often referred because they include several species.Thus, Fabaceae families with 28 species; Combretaceae and Euphorbiaceae with 7 species; Rubiaceae and Anacardiaceae with 6 species; Moraceae with 5 species; Malvaceae, Capparaceae and Apocynaceae with 4 species; Verbenaceae with species; Celastraceae, Rhamnaceae, Lamiaceae and Meliaceae with 2 species and everything else is represented by a single species (Fig. 2). These results are not in agreement with those found by Manga [17] with 88 plant species from 79 genera and 35 families but the most cited families have in common the Fabaceae. This state of affairs is understandable because the geographical area of studies differs. The reality with regard to the use of plants is thus different according to the District. The Fabaceae family contains many species of plants known for nutritional and medicinal value. These include the *Acacia nilotica* species that has shown antioxidant and antiinflammatory activity [18]. The *Pterocarpus erinaceus* species has shown antiinflammatory, analgesic and antipyretic activity [19].

Kisangau [20] has shown used in the management of opportunistic AIDS diseases on *Carica papaya* L.

The Combretaceae plant family contains several species that are known to be Anti – inflammatoire, immunomodulatory, anti-nociceptive, antidiabétique, hypotenseur, antioxidant etc. [21,22,23,24].

These include Terminalia and Combretum genera which gave various activities. *Terminalia arjuna* and *Terminalia catappa* has shown anti–inflammatoire, immunomodulatory, anti-nociceptive and antidiabétique properties [22,23]. The *Terminalia avicennoides* species has indicated antimicrobial activity [25].

Euphorbiaceae family contain plant species that have been source of medicine and some have shown potential at experimental stages. *Jatropha curcas* and *Ricinus communis* has shown antioxidant properties and have an inhibitory action on acetylcholinesterase activity [26].

The foregoing literature findings suggest that plants from the three families contain ingredients that are useful for deseases.

Fig. 2 shows the family classification of species.

The most frequently mentioned plants are: *Pterocarpus erinaceus* (60%), *Acacia nilotica* (58,1%), *Ficus thonningii* (54,5%), *Detarium microcarpum* (52,7%), *Guiera senegalensis* (45,4%), *Lepisanthes senegalensis* (36,4%), *Adansonia digitata* L. (31%), *Acacia seyal* Del. (29, 2%), *Faidherbia albida* (Del.) Chev. (29, 2%), *Combretum glutinosum* Perr. ex DC. (27, 2%), *Ficus sycomorus* ssp (Miq.) C.C. Berg (25,4%) and *Psidium guajava* L. (25,4%). These results are similar to those of Manga [17] found 13 plants for the treatment of opportunistic deseases. These two authors have two similar species among the species mentioned by our actors: These two authors have two similar species among the species mentioned by our interviewees: *Pterocarpus erinaceus* and *Guiera senegalensis*. The highest number of plant species used to treat the various conditions. It was followed by Tuberculosis and Mycosis (40), Weight delay (33), Anemia (28), Encephalitis and diarrhea (27), Asthenia (23), Bronchitis (24), Oral candidiasis and Aphtha (18), Furuncle and Pneumonia (16) (Fig. 3).

Table 1. The families, scientific names, local names, common names, affections of studied plants and the preparations (application) are summarized

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
1. *Acacia nilotica* (L.) Willd. ex Del. (Fabaceae)	Red gum tree	Neb neb (Wo)	Aphtha, Oral candidiasis, Diarrhea, Mycosis, pneumonia, Weight delay, Tuberculosis	Barks and Seeds	Maceration and Powder applicate	58
2. *Acacia senegal* (L.) Willd. (Fabaceae)	Verek	Wéreng (Wo)	Diarrhea	Barks	Maceration	2
3. *Acacia seyal* Del. (Fabaceae)	Thorny Mimosa	Suuruur (Wo)	Aphtha, Asthenia, Mycosis, Weight delay	Barks	Decoction or Maceration	30
4. *Adansonia digitata* L. (Malvaceae)	Baobab	Gouye (Wo)	Anemia, Aphtha, Asthenia, Diarrhea, Mycosis, Weight delay, Tuberculosis	Barks and Fruit	Maceration or Decoction	31
5. *Allium cepa* L. (Alliaceae)	Onion	Soblé (Wo)	Tuberculosis	Tuber	Decoction	2
6. *Anacardium occidentale* L. (Anacardiaceae)	Mahogany	Ndar kasso (Wo)	Anemia, Asthenia, Oral candidiasis, Diarrhea, Mycosis, Weight delay	Barks	Decoction and Maceration	22
7. *Ananas comosus* (L.) Merr. (Bromeliaceae)	Pineapple	Ananas	Tuberculosis	Leaves	Decoction	2
8. Anogeissus leiocarpus (DC.) Guill. & Perr. (Combretaceae)	African birch	Ngédiane (Wo)	Aphtha, Diarrhea, Encephalitis, Mycosis, Tuberculosis	Leaves, Barks and Roots	Decoction and Maceration	36
9. *Arachis hypogaea L.* (Fabaceae)	Peanut	Guerté (Wo)	Aphtha, Asthenia, Pneumonia	Leaves and Seeds	Decoction and Maceration	9
10. *Balanites aegyptiaca* (L.) Del. (Balanitaceae)	Palm tree desert	Soumpe (Wo)	Mycosis	Stem	Decoction	2
11. *Boscia senegalensis* (Pers.) Lam. ex Poir. (Capparaceae)	Indetermined	Niandam (Wo)	Anemia, Oral candidiasis, Furuncle, Mycosis	Leaves and Roots	Decoction or Powder applicate	9
12. *Cadaba farinosa* Forssk. (Capparaceae)	Indetermined	NDéga ré (Se)	Weight delay	Barks	Maceration	2
13. *Calotropis procera* (Ait.) Ait. f. (Apocynaceae)	Sodom apple	Poftan (Wo)	Aphtha, Furuncle, Tuberculosis	Roots, Juice and Leaves	Decoction	7
14. *Capparis tomentosa* Lam. (Capparaceae)	Caprier Africa	Xarèñ (Wo)	Mycosis	Barks	Decoction	2
15. *Carica papaya* L. (Caricaceae)	Papaya	Papayo (Wo)	Tuberculosis	Roots	Maceration	2
16. *Cassia absus* L. (Fabaceae)	Black grain	Sufarnaq (Se)	Anemia, Encephalitis	All the plant	Decoction	4
17. *Senna italica* (Mill.) Spreng. (Fabaceae)	African sene	Laydour (Wo)	Asthenia, Diarrhea, Weight delay, Tuberculosis	Leaves, Roots	Decoction, powder consume and Maceration	13

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
18. *Senna occidentalis* L. (Fabaceae)	False kinkeliba / stinky herb	Mbanta maré (Wo)	Encephalitis, Mycosis, Weight delay, Tuberculosis	Leaves, Roots	Decoction and Fumigation	16
19. *Cassia sieberiana* DC. (Fabaceae)	Cassia sieber	Sendiène (Wo)	Anemia, Encephalitis, Mycosis, Weight delay, Tuberculosis	Barks, Leaves, Roots	Decoction and Maceration	18
20. *Ceiba pentandra* (L.) Gaertn. (Malvaceae)	cheesemonger	Bentéñé (Wo)	Diarrhea, Furuncle	Roots and sap	Decoction , applicate sap	5
21. *Celtis toka Forssk* (Ulmaceae)	African hackberry	Ngam (Se)	Furuncle, Mycosis, Weight delay, Tuberculosis	Leaves, Barks, Roots	Decoction or Maceration or infusion	22
22. *Cissampelos mucronata* A.Rich. (Menispermaceae)	Indetermined	Ngolamar (Wo)	Weight delay	Roots	Infusion	2
23. Cissus polpunea Guill. & Perr. (Vitaceae)	Sorrel Pygmies	Mbogoye (Se)	Furuncle	Roots	Maceration	2
24. *Clerodendrum capitatum* (Willd.) Schumach (Verbenaceae)	Indetermined	Biboc (Se)	Encephalitis	Roots	Decoction	2
25. *Cochlospermum tinctorium* Perr.ex A. Rich. (Cochlospermaceae)	Indetermined	Fayar (Wo)	Anemia, Aphtha, Furuncle, Weight delay	Leaves, Roots	Decoction and powder applicate	11
26. *Cocos nucifera* L. (Arecaceae)	Coconut tree	Coco (Wo)	Oral candidiasis	Coconut water	For drink	2
27. *Combretum glutinosum*Perr. ex DC. (Combretaceae)	Elephant wood	Ratt (Wo)	Anemia, Encephalitis, Furuncle, Mycosis, Pneumonia, Tuberculosis	Leaves,	Decoction or Infusion, maceration, applicate	27
28. *Combretum micranthum* G. Don (Combretaceae)	Kinkeliba	Kinkéliba (Wo)	Anemia, Mycosis, Pneumonia, Weight delay, Tuberculosis	Leaves	Decoction, Infusion or maceration	11
29. *Combretum molle* R.Br. ex G. Don (Combretaceae)	Indetermined	Ganianka (Wo)	Furuncle, Pneumonia, Tuberculosis	Leaves	Decoction	5
30. *Combretum nigricans*Lepr. ex Guill. et Perr. (Combretaceae)	Indetermined	Taab (Wo)	Encephalitis, Tuberculosis	Leaves	Decoction	4
31. *Cordyla pinnata*(Lepr. ex A. Rich.) Milne-Redhead (Fabaceae)	Pear tree of Cayor	Dimb (Wo)	Diarrhea, Mycosis, Weight delay	Barks	Maceration	13
32. *Crotalaria atrorubens* Hochst. Benth. (Fabaceae)	Indetermined	Dougor (Se)	Aphtha, Weight delay	Leaves	Maceration or Infusion	5
33. *Daniellia oliveri* (Rolfe) Hutch. & Dalz. (Fabaceae)	Terebenthe tree	Séléone (Se)	Weight delay	Roots	Maceration	2

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
34. *Detarium microcarpum* Guill. & Perr. (Fabaceae)	Small detar	Dank (Wo)	Anemia, Aphtha, Mycosis, Tuberculosis	Leaves, Barks or Roots	Decoction or Maceration	53
35. *Detarium senegalense* Gmel. (Fabaceae)	Tallow tree	Ditah (Wo)	Anemia	Barks	Infusion	2
36. *Diospyros mespiliformis* Hochst. ex A. Rich. (Ebenaceae)	Monkey guava	Alome (Wo)	Diarrhea, Encephalitis, Mycosis	Fruit, Leaves, Roots	Decoction, Powder applicate	11
37. *Ekebergia capensis* Sparrm. (Meliaceae)	Indetermined	Hartoy (Se)	Aphtha, Asthenia	Leaves, Barks	Decoction or Maceration	4
38. *Entada africana* Guill. & Perr. (Fabaceae)	Sword bean	Mbathiar (Wo)	Mycosis	Roots	Infusion	2
39. *Erythrina senegalensis* DC. (Fabaceae)	Senegalese Erythrina	Berou (Wo)	Oral candidiasis	Roots	Maceration	2
40. *Erythrophleum suaveolens* (Guill. & Perr.) Brenan (Fabaceae)	Red Wood	Talidé (Pe)	Asthenia	Barks	Decoction	2
41. *Euphorbia balsamifera* Ait. (Euphorbiaceae)	Euphorbia of Cayor	Salane (Wo)	Oral candidiasis, Furuncle, Mycosis, Weight delay, Tuberculosis	Barks, Leaves, Stem and Sap	Maceration or Decoction or applicate sap	18
42. *Euphorbia hirta* L. (Euphorbiaceae)	Unknown	Mbal (Wo)	Diarrhea, Weight delay	All the plant	Decoction	13
43. *Faidherbia albida* (Del.) Chev. (Fabaceae)	Kade	Kadd (Wo)	Aphtha, Mycosis, Pneumonia, Weight delay, Tuberculosis	Barks or Roots	Maceration or Infusion or Infusion	29
44. *Feretia apodanthera* Del. (Rubiaceae)	Indetermined	Santhiere (Wo)	Oral candidiasis, Pneumonia	Leaves	Decoction	7
45. *Ficus glumosa* Del. (Moraceae)	Indetermined	Saghay (Se)	Anemia	Roots	Decoction	2
46. *Ficus lutea* Vahl. (Moraceae)	Indetermined	Badat (Se)	Anemia, Tuberculosis	Roots	Decoction	5
47. *Ficus sur* forssk (Moraceae)	little sycamore	Soto (Wo)	Asthenia, Tuberculosis	Leaves	Decoction	4
48. *Ficus sycomorus* L. (Moraceae)	Indetermined	Geung (Wo)	Anemia, Aphtha, Asthenia, Furuncle, Mycosis, Tuberculosis	Barks or Roots, Sap	Decoction or Maceration, sap applicate	25
49. *Ficus thonningii* Blume (Moraceae)	Indetermined	Loro(Wo)	Anemia, Asthenia, Weight delay	Barks or Roots	Decoction or Maceration	55
50. *Flemingia faginea* (Burm.f.) Merr. (Fabaceae)	Indetermined	Sanfitò (Ma)	Asthenia, Encephalitis, Weight delay, Tuberculosis	Leaves	Decoction	7
51. *Flueggea virosa* (Roxb. ex Willd.) Voigt (Euphorbiaceae)	Indetermined	Mbaram mbaram (Se)	Oral candidiasis, Mycosis	Roots	Maceration	4
52. *Gardenia ternifolia* Schumach. & Thonn. (Rubiaceae)	Indetermined	Dibutone (Wo)	Anemia, Tuberculosis	Barks and Roots	Decoction or Maceration	5

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
53. *Gossypium barbadense* L. (Malvaceae)	Cotton Plant	Wittén (Wo)	Diarrhea, Tuberculosis	Roots and Leaves	Decoction	5
54. *Grewia bicolor*Juss. (Tiliaceae)	Baobab rabbits	Kél (Wo)	Asthenia, Weight delay	Barks	Decoction or Maceration	20
55. *Guiera senegalensis* J.F. Gmel. (Combretaceae)	nger	Nger (Wo)	Aphtha, Encephalitis, Mycosis, Tuberculosis	Leaves	Decoction	45
56. *Gymnosporia senegalensis* (Lam.) Loes (Celastraceae)	Senegalese Maytenus	Bén deuk (Wo)	Oral candidiasis	Roots	Maceration	2
57. *Hallea stipulosa (DC.) Leroy* (Rubiaceae)	Lime Africa	Popordé (Pe)	Oral candidiasis	Stem	Decoction	2
58. *Heliotropium indicum L.* (Boraginaceae)	Cockscomb	Xeteroum (Wo)	Aphtha	Leaves	Decoction	2
59. *Hexalobus monopetalus* (A. Rich.) Engl. & Diels (Annonaceae)	Indetermined	Mbelam (Se)	Aphtha, Asthenia	Leaves and Barks	Decoction	4
60. *Hibiscus sabdariffa L.* (Malvaceae)	Guinea sorrel	Bissap (Wo)	Anemia, Asthenia	Petals	Maceration	9
61. *Holarrhena floribunda* (G. Don) Dur. & Schinz (Apocynaceae)	Holarrrhene floriferous	Salali (Wo)	Weight delay	Roots	Infusion	2
62.*Hygrophila auriculata* (Schumach.) Heine (Acanthaceae)	Asteracan-tha	Seber buki (Wo)	Pneumonia	Leaves	Decoction	2
63. *Hymenocardia acida*Tul. (Euphorbiaceae)	Big heart	Enkelen (Wo)	Pneumonia, Tuberculosis	Leaves	Decoction	24
64. *Indigofera arrecta* Hochst. Ex A.Rich. (Fabaceae)	indigo plant	Nonan (Se)	Mycosis, Tuberculosis	Roots and Leaves	Maceration and Decoction	4
65. *Indigofera dendroides* Jacq. (Fabaceae)	Indetermined	Seker(Wo)	Oral candidiasis, Mycosis	Roots	Maceration or Decoction	4
66. *Jatropha chevalieri* Beille (Euphorbiaceae)	Indetermined	Wittéen bot (Wo)	Mycosis	Roots	Decoction or Infusion or maceration	14
67. *Jatropha curcas L.* (Euphorbiaceae)	Jatropha	Tabanani (Wo)	Tuberculosis	Leaves	Decoction	4
68. *Khaya senegalensis* (Desr.) A. Juss.(Meliaceae)	Caïlcedrat	Khay (Wo)	Anemia, Asthenia, Oral candidiasis, Furuncle, Mycosis, Pneumonia	Barks	Decoction or Maceration or infusion	18
69. *Lannea acida* A. Rich. (Anacardiaceae)	Raisin acid tree	Soone (Wo)	Anemia, Diarrhea, Encephalitis, Mycosis, Weight delay	Barks	Maceration or Decoction or Infusion	24

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
70. *Lannea velutina* A. Rich. (Anacardiaceae)	Indetermined	Sonabey (Wo)	Tuberculosis	Barks	Decoction	5
71. *Lepisanthes senegalensis (*Juss. Ex Poir.) Leenh (Sapindaceae)	Cherry of Cayor	Xewar (Wo)	Anemia, Asthenia, Encephalitis	Leaves	Decoction or Infusion or Maceration	36
72. *Leptadenia hastata* (Pers.) Decne. (Apocynaceae)	Indetermined	Thiahat (Wo)	Encephalitis, Furuncle, Tuberculosis	Sap, Leaves	Sap applicate and Decoction	5
73. *Lippia chevalieri* Moldenke (Verbenaceae)	Gambian Tea	Mbalat (Se)	Pneumonia	Leaves	Decoction	2
74. *Lophira lanceolata* Van Tiegh. ex Keay (Ochnaceae)	False shea	Malaga (Pe)	Pneumonia	Leaves	Decoction	2
75. *Lycopersicon esculentum* Van Tiegh. ex Keay (Solanaceae)	Tomato	Tamaté (Wo)	Pneumonia	Leaves	Decoction	2
76. *Maerua angolensis* DC. (Capparaceae)	Indetermined	Safoye (Se)	Weight delay	Barks	Maceration	2
77. *Mangifera indica* L. (Anacardiaceae)	Mango	Mango (Wo)	Diarrhea	Barks	Decoction	2
78. *Mentha piperata* (Lamiaceae)	Peppermint	Nana menthe (Wo)	Tuberculosis	Leaves	Decoction	2
79. *Merremia tridentata* (L.) Hallier f. (Convolvulaceae)	Indetermined	Lebeul pul (Se)	Encephalitis	Leaves	Decoction	2
80. *Mitragyna inermis* (Willd.) Kuntze (Rubiaceae)	Jun	Xoos (Wo)	Mycosis	Barks or Roots	Decoction or Infusion or Maceration	18
81. *Momordica balsamina* L. (Cucurbitaceae)	Balsam apple	Mbirbop (Wo)	Mycosis, Tuberculosis	Leaves	Decoction	16
82. *Musa paradisiaca* L. (Musaceae)	Bananier	Banana (Wo)	Aphtha	Fruit	Apply on lesions	2
83. *Neocarya macrophylla* (Sabine) Prance (Chrysobalanaceae)	Cayor apple	New (Wo)	Mycosis, Weight delay, Tuberculosis	Barks, Fruit and Leaves	Maceration and Decoction	11
84. *Ocimum basilicum* L. var. basilicum (Lamiaceae)	Basilic	Ngun ngun (Wo)	Encephalitis	Leaves	Decoction	5
85. *Ozoroa benguellensis* (Engl.) R.Fern. (Anacardiaceae)	Indetermined	Waswasor (Wo)	Anemia, Oral candidiasis, Diarrhea, Encephalitis	Roots, Barks	Decoction or Maceration	5
86. *Parkia biglobosa*(Jacq.) R. Br. ex G. Don (Fabaceae)	Nété	Oule (Wo)	Oral candidiasis, Diarrhea, Encephalitis	Leaves, Barks	Decoction and Maceration	7

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
87. *Parkinsonia aculeata* L. (Fabaceae)	Thorny Genet	Mbarka sogné (Wo)	Diarrhea	Leaves	Maceration	2
88. *Pennisetum glaucum* (L.) R.Br. (Poaceae)	millet	Souna (Wo)	Asthenia, Diarrhea, Mycosis, Pneumonia	Seeds	Maceration	14
89. *Pericopsis laxiflora* (Benth.) Meeuwen (Fabaceae)	False dalbergia	Kulu kulu (Wo)	Diarrhea, Encephalitis, Mycosis	Roots, Leaves and Barks	Decoction and Maceration	13
90. *Philenoptera laxiflora* (Guill. & Perr.) Roberty (Fabaceae)	Indetermined	Gnignah (Se)	Encephalitis, Mycosis	Leaves	Decoction	4
91. *Piliostigma reticulatum* (DC.) Hochst. (Fabaceae)	Semelier	Nguigis (Wo)	Anemia, Aphtha, Oral candidiasis, Diarrhea, Encephalitis, Furuncle, Weight delay, Tuberculosis	Leaves, Barks	Decoction or Maceration or Infusion	18
92. *Prosopis africana* Taub. (Fabaceae)	Prosopis	Hiir (Wo)	Anemia, Asthenia, Diarrhea, Encephalitis, Weight delay, Tuberculosis	Barks and Leaves	Maceration or Decoction	24
93. *Psorospermum senegalense* Spach – *Guttiferae* (Hypericaceae)	Indetermined	Katidiankou-ma (So)	Aphtha	Leaves	Decoction	2
94. *Psidium guajava* L. (Myrtaceae)	Goyava	Gouyab (Wo)	Diarrhea, Mycoses, Weight delay	Barks and Leaves	Maceration or Decoction	25
95. *Pterocarpus erinaceus* Poir. (Fabaceae)	Vêne	Wén (Wo)	Anemia, Asthenia, Diarrhea, Encephalitis, Weight delay, Tuberculosis	Barks or Leaves	Decoction	60
96. *Quassia undulata*(Guill. & Perr.) F.Dietr (Simaroubaceae)	Sugar cane	Ngothie (Wo)	Encephalitis	Leaves	Decoction	2
97. *Ricinus communis*L. (Euphorbiaceae)	Ricin tree	Dambal (Se)	Weight delay	Seeds	Seed to consume	2
98. *Saba senegalensis*(A. DC.) Pichon (Apocynaceae)	Saba Liana	Madd (Wo)	Asthenia	Fruit	eaten the ripe fruit	2
99. *Salacia senegalensis* (Lam.) DC (Celastraceae)	Indetermined	Xebet (Wo)	Asthenia, Encephalitis	Leaves	Decoction or Maceration	2
100. *Sarcocephalus latifolius* (Smith) Bruce (Rubiaceae)	African sin	Nandok (Wo)	Diarrhea, Weight delay	Roots	Maceration	4
101. *Sclerocarya birrea* (A. Rich.) Hochst. (Anacardiaceae)	Marula	Béer (Wo)	Anemia, Aphtha, Furuncle, Tuberculosis	Barks	Maceration or Infusion or Decoction	9

Families and botanical names	Common names	Vernacular name	Affections	Used parts	Preparations	Quote percentage
102. *Securidaca longepedunculata* Fres. (Polygalaceae)	Snake tree	Fouf (Wo)	Encephalitis	Roots	Decoction	5
103. *Spermacoce verticillata* L. (Rubiaceae)	Indetermined	Mourah (Se)	Mycosis	whole plant	Decoction	2
104. *Sterculia setigera* Del. (Sterculiaceae)	Gum tree	Mbép (Wo)	Aphtha, Pneumonia, Tuberculosis	Barks	Maceration or Infusion or Decoction	24
105. *Stereospermum kunthianum* Cham. (Bignoniaceae)	Indetermined	Féh (Wo)	Asthenia, Diarrhea, Mycosis	Barks and Roots	Maceration or Infusion or Decoction	9
106. *Strychnos spinosa* Lam.(Strychnaceae)	Indetermined	Gum saye (Se)	Diarrhea	Barks	Decoction	2
107. *Terminalia avicennoides* Guill. & Perr. (Combretaceae)	Fluffy badamier	Reuba reub (Wo)	Anemia, Oral candidiasis, Diarrhea	Barks, Roots	Decoction, Maceration	5
108. *Vernonia colorata* (Willd.) Drake (Asteraceae)	Bitter leaf	Docteur (Wo)	Mycosis	Leaves	Decoction	2
109. *Vigna unguiculata* (L.) Walp. var. unguiculata (Fabaceae)	Native bean	Niébé (Wo)	Anemia	Seeds	Decoction	2
110. *Vitellaria paradoxa* Gaertn. f. (Sapotaceae)	Butter tree	Karité (Wo)	Aphtha, Oral candidiasis, Furuncle	Seeds	butter to apply	5
111. *Vitex doniana* Sweet (Verbenaceae)	Black plum	Leung (Wo)	Mycosis, Pneumonia, Weight delay, Tuberculosis	Roots or Barks or Leaves	Decoction	14
112. *Ximenia americana* L. (Olacaceae)	Sea plum	Ngologne (Wo)	Anemia, Encephalitis	Roots and Leaves	Maceration or Decoction	5
113. *Zanthoxylum zanthoxyloides* (Lam.) (Rutaceae)	Fagara	Gengidek (Wo)	Asthenia, Oral candidiasis, Furuncle, Mycosis, Tuberculosis	Roots	Maceration, Apply powder	14
114. *Zizyphus mauritiana* Lam. (Rhamnaceae)	Jujube	Sidéem (Wo)	Anemia, Diarrhea, Weight delay	Fruit and Roots	Eaten on the ripe fruit, Maceration	7
115. *Ziziphus mucronata* Willd. (Rhamnaceae)	Jujube hyena	Déemou buki (Wo)	Mycosis	Roots	Maceration	4

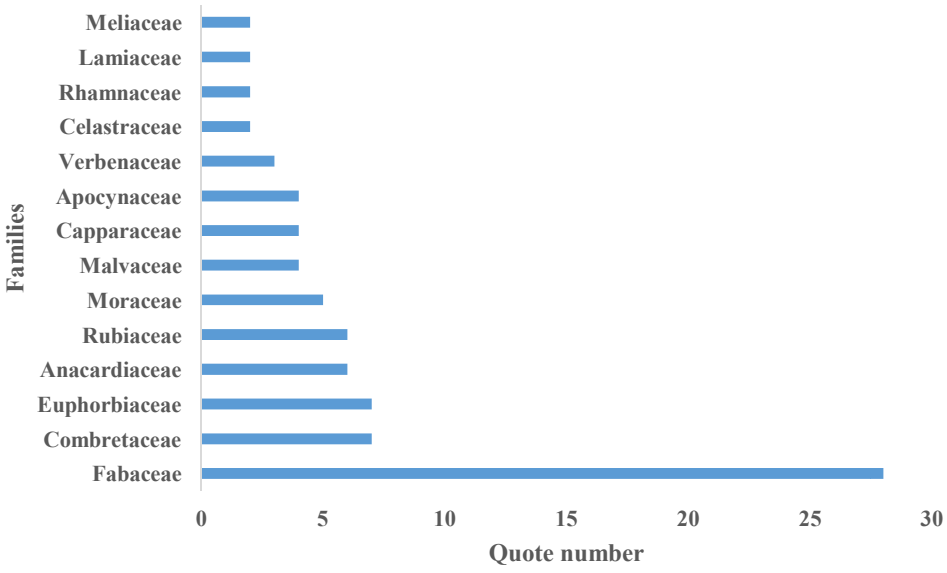

Fig. 2. Families classification plant

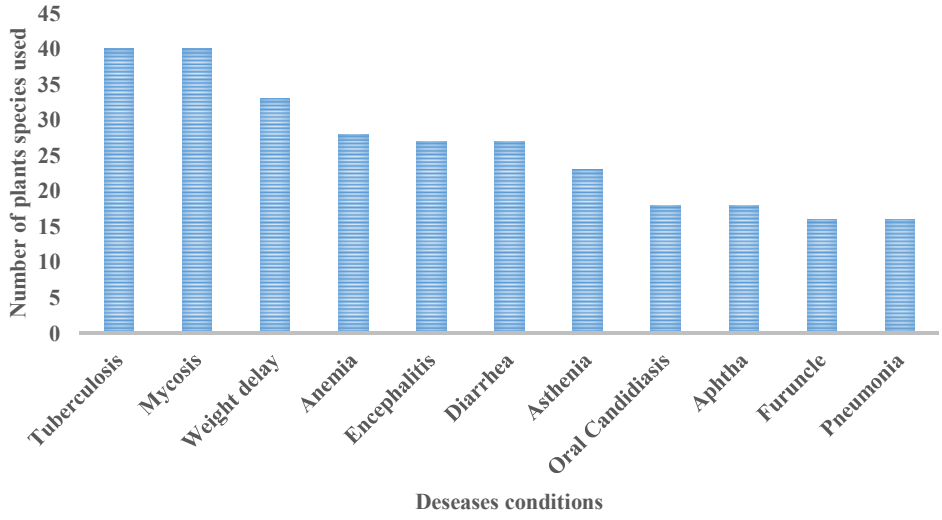

Fig. 3. Disease conditions versus the number of plant species used to treat them

No one species has been found to treat all affections, however, there are some that are used to treat three or four diseases.

Manga [17] found the same types of diseases in the Ziguinchor area which is consistent with our survey.

The leaves and barks are the organs mainly used for the medicinal preparations. These results are according to Manga [17] who demonstrate that leaves are mainly used during treatments traditional and not according to those of Thirumalai et al. [24] who in a similar study in India has found that the part of the most used plant is the leafy stem. Leaves are commonly used because they have a higher content of bioactive compounds that treats the infection (25). The utilization of leaves in local medications inflicting less damaged to the medicinal plants

and is advantageous as far as conservation is concerned (auteur). This is understandable because the pathology involved and the area geographical study are different. The decoction (50%) is the most used mode. These results are similar to those obtained by Manga [17] in the Ziguinchor District. Fig. 4 the mode used of plants.

Most of these plant parts were harvested unconventionally, with no reforestation politic for future resource availability. For example, there were signs of severe tree attack, uprooting or cutting of the entire plant.

The decoction (50%) is the most used mode, followed by maceration. These result are not according to Manga [17] who obtain at first the infusion (58%). This difference in medical preparation may be due to the differences between the species found on both sides of the planet. Decoction as boiling method is an effective method of preparing medicinal plant because it preserves the medicine longer when compared to cold water. According to Shehu in traditional medicine, boiling is believed to be efficient in extracting active ingredient and for hygienic reasons. Similarly, the use of *Guiera senegalensis* and *Detarium microcarpum* to treat Tuberculosis is consistent with data reported by Manga [17]. Such a similarity in the cross-cultural use of plant remedies is a strong indication of the bioactivity potential of the reported plants.

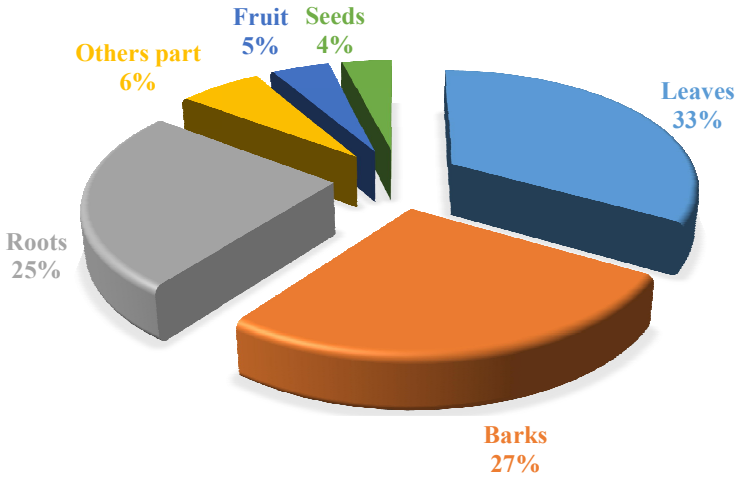

Fig. 4. Percentage use of plant parts

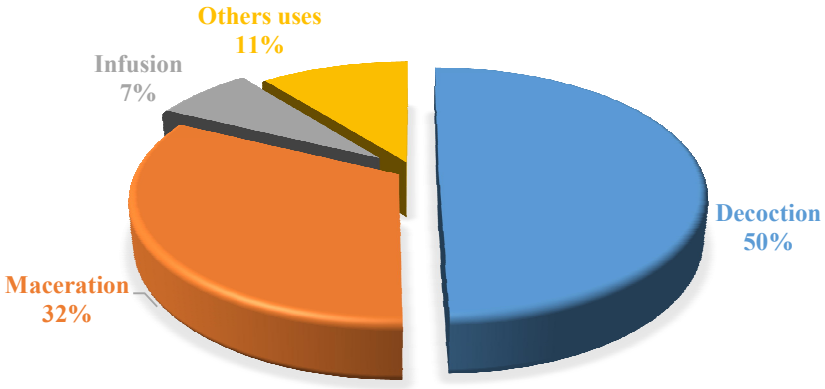

Fig. 5. Plant preparation mode

4. CONCLUSION

Kaolack and Fatick are endowed with a large number of plant species that can be used to manage HIV/AIDS opportunistic deseases. A total number of (115) plants species were identified, but the number could even be higher. Plants from the family Fabaceae, Combretaceae, Euphorbiaceae and Anacardiaceae were the most frequently used plants. The most commonly used plant part was leaves for the management of HIV/ AIDS opportunistic infections. The plants were used to manage several infections but the most commonly mentioned were tuberculosis, mycosis, Weight delay, Anemia, Encephalitis, diarrhea, Asthenia, oral candidiasis, Aphtha, furuncle and Pneumonia. The mode of application used by traditional medicinal practitioners (TMPs) was predominantly by decoction drink.

The ethno-pharmacological information provides a solid basis for further research aimed at identifying and isolating bioactive components that can be converted into drugs for the management of opportunistic HIV / AIDS deseases.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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