```python
In [9]: resnet_results = {

    1: {"coverage": 0.899, "avg_size": 0.904,
        "class_cov": {
            "esantema-maculo-papuloso": 0.877,
            "esantema-morbilliforme": 0.920,
            "esantema-polimorfo-like": 0.848,
            "esantema-virale": 0.892,
            "esantema_iatrogeno_farmaco_indotta": 0.928,
            "orticaria": 0.904,
            "pediculosi": 0.930,
            "scabbia": 0.901,
            "varicella": 0.836
        }},

    2: {"coverage": 0.898, "avg_size": 0.902,
        "class_cov": {
            "esantema-maculo-papuloso": 0.866,
            "esantema-morbilliforme": 0.926,
            "esantema-polimorfo-like": 0.825,
            "esantema-virale": 0.887,
            "esantema_iatrogeno_farmaco_indotta": 0.922,
            "orticaria": 0.915,
            "pediculosi": 0.891,
            "scabbia": 0.898,
            "varicella": 0.811
        }},

    3: {"coverage": 0.900, "avg_size": 0.904,
        "class_cov": {
            "esantema-maculo-papuloso": 0.825,
            "esantema-morbilliforme": 0.915,
            "esantema-polimorfo-like": 0.846,
            "esantema-virale": 0.876,
            "esantema_iatrogeno_farmaco_indotta": 0.915,
            "orticaria": 0.927,
            "pediculosi": 0.915,
            "scabbia": 0.899,
            "varicella": 0.819
        }},

    4: {"coverage": 0.899, "avg_size": 0.905,
        "class_cov": {
            "esantema-maculo-papuloso": 0.851,
            "esantema-morbilliforme": 0.936,
            "esantema-polimorfo-like": 0.862,
            "esantema-virale": 0.885,
            "esantema_iatrogeno_farmaco_indotta": 0.929,
            "orticaria": 0.908,
            "pediculosi": 0.930,
            "scabbia": 0.907,
            "varicella": 0.843
        }},
```

```
5: {"coverage": 0.900, "avg_size": 0.906,
    "class_cov": {
        "esantema-maculo-papuloso": 0.866,
        "esantema-morbilliforme": 0.936,
        "esantema-polimorfo-like": 0.853,
        "esantema-virale": 0.886,
        "esantema_iatrogeno_farmaco_indotta": 0.923,
        "orticaria": 0.911,
        "pediculosi": 0.903,
        "scabbia": 0.917,
        "varicella": 0.841
    }},

6: {"coverage": 0.902, "avg_size": 0.908,
    "class_cov": {
        "esantema-maculo-papuloso": 0.877,
        "esantema-morbilliforme": 0.925,
        "esantema-polimorfo-like": 0.865,
        "esantema-virale": 0.904,
        "esantema_iatrogeno_farmaco_indotta": 0.929,
        "orticaria": 0.899,
        "pediculosi": 0.937,
        "scabbia": 0.921,
        "varicella": 0.827
    }},

7: {"coverage": 0.900, "avg_size": 0.905,
    "class_cov": {
        "esantema-maculo-papuloso": 0.876,
        "esantema-morbilliforme": 0.944,
        "esantema-polimorfo-like": 0.864,
        "esantema-virale": 0.860,
        "esantema_iatrogeno_farmaco_indotta": 0.933,
        "orticaria": 0.919,
        "pediculosi": 0.927,
        "scabbia": 0.924,
        "varicella": 0.832
    }},

8: {"coverage": 0.900, "avg_size": 0.905,
    "class_cov": {
        "esantema-maculo-papuloso": 0.863,
        "esantema-morbilliforme": 0.955,
        "esantema-polimorfo-like": 0.860,
        "esantema-virale": 0.892,
        "esantema_iatrogeno_farmaco_indotta": 0.931,
        "orticaria": 0.906,
        "pediculosi": 0.914,
        "scabbia": 0.907,
        "varicella": 0.814
    }},

9: {"coverage": 0.900, "avg_size": 0.906,
    "class_cov": {
        "esantema-maculo-papuloso": 0.854,
        "esantema-morbilliforme": 0.925,
```

```
            "esantema-polimorfo-like": 0.843,
            "esantema-virale": 0.877,
            "esantema_iatrogeno_farmaco_indotta": 0.937,
            "orticaria": 0.917,
            "pediculosi": 0.916,
            "scabbia": 0.913,
            "varicella": 0.827
        }},

    10: {"coverage": 0.899, "avg_size": 0.903,
         "class_cov": {
            "esantema-maculo-papuloso": 0.890,
            "esantema-morbilliforme": 0.952,
            "esantema-polimorfo-like": 0.840,
            "esantema-virale": 0.884,
            "esantema_iatrogeno_farmaco_indotta": 0.927,
            "orticaria": 0.904,
            "pediculosi": 0.924,
            "scabbia": 0.920,
            "varicella": 0.822
        }},

    11: {"coverage": 0.900, "avg_size": 0.905,
         "class_cov": {
            "esantema-maculo-papuloso": 0.861,
            "esantema-morbilliforme": 0.935,
            "esantema-polimorfo-like": 0.845,
            "esantema-virale": 0.880,
            "esantema_iatrogeno_farmaco_indotta": 0.924,
            "orticaria": 0.915,
            "pediculosi": 0.915,
            "scabbia": 0.910,
            "varicella": 0.855
        }},

    12: {"coverage": 0.900, "avg_size": 0.905,
         "class_cov": {
            "esantema-maculo-papuloso": 0.874,
            "esantema-morbilliforme": 0.937,
            "esantema-polimorfo-like": 0.857,
            "esantema-virale": 0.898,
            "esantema_iatrogeno_farmaco_indotta": 0.920,
            "orticaria": 0.904,
            "pediculosi": 0.914,
            "scabbia": 0.907,
            "varicella": 0.816
        }},

    13: {"coverage": 0.899, "avg_size": 0.905,
         "class_cov": {
            "esantema-maculo-papuloso": 0.880,
            "esantema-morbilliforme": 0.931,
            "esantema-polimorfo-like": 0.849,
            "esantema-virale": 0.887,
            "esantema_iatrogeno_farmaco_indotta": 0.934,
            "orticaria": 0.905,
```

```
            "pediculosi": 0.935,
            "scabbia": 0.907,
            "varicella": 0.829
    }},

14: {"coverage": 0.901, "avg_size": 0.906,
     "class_cov": {
            "esantema-maculo-papuloso": 0.864,
            "esantema-morbilliforme": 0.948,
            "esantema-polimorfo-like": 0.837,
            "esantema-virale": 0.899,
            "esantema_iatrogeno_farmaco_indotta": 0.918,
            "orticaria": 0.905,
            "pediculosi": 0.916,
            "scabbia": 0.913,
            "varicella": 0.851
    }},

15: {"coverage": 0.900, "avg_size": 0.904,
     "class_cov": {
            "esantema-maculo-papuloso": 0.851,
            "esantema-morbilliforme": 0.931,
            "esantema-polimorfo-like": 0.816,
            "esantema-virale": 0.904,
            "esantema_iatrogeno_farmaco_indotta": 0.944,
            "orticaria": 0.903,
            "pediculosi": 0.929,
            "scabbia": 0.894,
            "varicella": 0.819
    }},

16: {"coverage": 0.902, "avg_size": 0.908,
     "class_cov": {
            "esantema-maculo-papuloso": 0.872,
            "esantema-morbilliforme": 0.951,
            "esantema-polimorfo-like": 0.840,
            "esantema-virale": 0.888,
            "esantema_iatrogeno_farmaco_indotta": 0.928,
            "orticaria": 0.914,
            "pediculosi": 0.931,
            "scabbia": 0.910,
            "varicella": 0.826
    }},

17: {"coverage": 0.900, "avg_size": 0.905,
     "class_cov": {
            "esantema-maculo-papuloso": 0.868,
            "esantema-morbilliforme": 0.943,
            "esantema-polimorfo-like": 0.870,
            "esantema-virale": 0.870,
            "esantema_iatrogeno_farmaco_indotta": 0.939,
            "orticaria": 0.912,
            "pediculosi": 0.930,
            "scabbia": 0.916,
            "varicella": 0.855
    }},
```

```
    18: {"coverage": 0.901, "avg_size": 0.907,
         "class_cov": {
              "esantema-maculo-papuloso": 0.843,
              "esantema-morbilliforme": 0.939,
              "esantema-polimorfo-like": 0.810,
              "esantema-virale": 0.886,
              "esantema_iatrogeno_farmaco_indotta": 0.932,
              "orticaria": 0.917,
              "pediculosi": 0.912,
              "scabbia": 0.908,
              "varicella": 0.847
         }},

    19: {"coverage": 0.901, "avg_size": 0.906,
         "class_cov": {
              "esantema-maculo-papuloso": 0.882,
              "esantema-morbilliforme": 0.952,
              "esantema-polimorfo-like": 0.862,
              "esantema-virale": 0.880,
              "esantema_iatrogeno_farmaco_indotta": 0.927,
              "orticaria": 0.914,
              "pediculosi": 0.905,
              "scabbia": 0.909,
              "varicella": 0.824
         }},

    20: {"coverage": 0.899, "avg_size": 0.905,
         "class_cov": {
              "esantema-maculo-papuloso": 0.881,
              "esantema-morbilliforme": 0.926,
              "esantema-polimorfo-like": 0.850,
              "esantema-virale": 0.873,
              "esantema_iatrogeno_farmaco_indotta": 0.930,
              "orticaria": 0.916,
              "pediculosi": 0.905,
              "scabbia": 0.907,
              "varicella": 0.842
         }},
}


vit_results = {

    1: {"coverage": 0.900, "avg_size": 0.901,
         "class_cov": {
              "esantema-maculo-papuloso": 0.872,
              "esantema-morbilliforme": 0.931,
              "esantema-polimorfo-like": 0.780,
              "esantema-virale": 0.879,
              "esantema_iatrogeno_farmaco_indotta": 0.951,
              "orticaria": 0.923,
              "pediculosi": 0.887,
              "scabbia": 0.887,
              "varicella": 0.838
```

```
        }},

    3: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.868,
            "esantema-morbilliforme": 0.951,
            "esantema-polimorfo-like": 0.859,
            "esantema-virale": 0.884,
            "esantema_iatrogeno_farmaco_indotta": 0.935,
            "orticaria": 0.917,
            "pediculosi": 0.913,
            "scabbia": 0.870,
            "varicella": 0.854
        }},

    2: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.873,
            "esantema-morbilliforme": 0.916,
            "esantema-polimorfo-like": 0.859,
            "esantema-virale": 0.899,
            "esantema_iatrogeno_farmaco_indotta": 0.926,
            "orticaria": 0.900,
            "pediculosi": 0.898,
            "scabbia": 0.918,
            "varicella": 0.852
        }},

    4: {"coverage": 0.902, "avg_size": 0.903,
        "class_cov": {
            "esantema-maculo-papuloso": 0.899,
            "esantema-morbilliforme": 0.936,
            "esantema-polimorfo-like": 0.873,
            "esantema-virale": 0.864,
            "esantema_iatrogeno_farmaco_indotta": 0.957,
            "orticaria": 0.925,
            "pediculosi": 0.896,
            "scabbia": 0.882,
            "varicella": 0.844
        }},

    5: {"coverage": 0.899, "avg_size": 0.900,
        "class_cov": {
            "esantema-maculo-papuloso": 0.862,
            "esantema-morbilliforme": 0.911,
            "esantema-polimorfo-like": 0.815,
            "esantema-virale": 0.889,
            "esantema_iatrogeno_farmaco_indotta": 0.920,
            "orticaria": 0.920,
            "pediculosi": 0.901,
            "scabbia": 0.872,
            "varicella": 0.863
        }},

    6: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
```

```
                "esantema-maculo-papuloso": 0.862,
                "esantema-morbilliforme": 0.927,
                "esantema-polimorfo-like": 0.834,
                "esantema-virale": 0.879,
                "esantema_iatrogeno_farmaco_indotta": 0.942,
                "orticaria": 0.927,
                "pediculosi": 0.910,
                "scabbia": 0.851,
                "varicella": 0.844
        }},

    7: {"coverage": 0.900, "avg_size": 0.902,
        "class_cov": {
                "esantema-maculo-papuloso": 0.901,
                "esantema-morbilliforme": 0.961,
                "esantema-polimorfo-like": 0.886,
                "esantema-virale": 0.880,
                "esantema_iatrogeno_farmaco_indotta": 0.936,
                "orticaria": 0.894,
                "pediculosi": 0.939,
                "scabbia": 0.938,
                "varicella": 0.879
        }},

    8: {"coverage": 0.900, "avg_size": 0.902,
        "class_cov": {
                "esantema-maculo-papuloso": 0.926,
                "esantema-morbilliforme": 0.958,
                "esantema-polimorfo-like": 0.812,
                "esantema-virale": 0.892,
                "esantema_iatrogeno_farmaco_indotta": 0.941,
                "orticaria": 0.893,
                "pediculosi": 0.895,
                "scabbia": 0.933,
                "varicella": 0.894
        }},


    9: {"coverage": 0.899, "avg_size": 0.900,
        "class_cov": {
                "esantema-maculo-papuloso": 0.874,
                "esantema-morbilliforme": 0.921,
                "esantema-polimorfo-like": 0.855,
                "esantema-virale": 0.900,
                "esantema_iatrogeno_farmaco_indotta": 0.942,
                "orticaria": 0.896,
                "pediculosi": 0.915,
                "scabbia": 0.900,
                "varicella": 0.859
        }},

    10: {"coverage": 0.900, "avg_size": 0.901,
         "class_cov": {
                "esantema-maculo-papuloso": 0.860,
                "esantema-morbilliforme": 0.964,
                "esantema-polimorfo-like": 0.861,
```

```
            "esantema-virale": 0.903,
            "esantema_iatrogeno_farmaco_indotta": 0.918,
            "orticaria": 0.903,
            "pediculosi": 0.865,
            "scabbia": 0.898,
            "varicella": 0.877
        }},

    11: {"coverage": 0.899, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.925,
            "esantema-morbilliforme": 0.950,
            "esantema-polimorfo-like": 0.882,
            "esantema-virale": 0.877,
            "esantema_iatrogeno_farmaco_indotta": 0.951,
            "orticaria": 0.891,
            "pediculosi": 0.919,
            "scabbia": 0.939,
            "varicella": 0.871
        }},

    12: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.881,
            "esantema-morbilliforme": 0.939,
            "esantema-polimorfo-like": 0.804,
            "esantema-virale": 0.907,
            "esantema_iatrogeno_farmaco_indotta": 0.938,
            "orticaria": 0.895,
            "pediculosi": 0.905,
            "scabbia": 0.927,
            "varicella": 0.827
        }},

    13: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.869,
            "esantema-morbilliforme": 0.946,
            "esantema-polimorfo-like": 0.873,
            "esantema-virale": 0.882,
            "esantema_iatrogeno_farmaco_indotta": 0.939,
            "orticaria": 0.906,
            "pediculosi": 0.937,
            "scabbia": 0.897,
            "varicella": 0.869
        }},

    14: {"coverage": 0.900, "avg_size": 0.901,
        "class_cov": {
            "esantema-maculo-papuloso": 0.891,
            "esantema-morbilliforme": 0.970,
            "esantema-polimorfo-like": 0.867,
            "esantema-virale": 0.899,
            "esantema_iatrogeno_farmaco_indotta": 0.943,
            "orticaria": 0.891,
            "pediculosi": 0.904,
```

```
            "scabbia": 0.913,
            "varicella": 0.863
        }},

15: {"coverage": 0.902, "avg_size": 0.904,
        "class_cov": {
            "esantema-maculo-papuloso": 0.914,
            "esantema-morbilliforme": 0.955,
            "esantema-polimorfo-like": 0.862,
            "esantema-virale": 0.883,
            "esantema_iatrogeno_farmaco_indotta": 0.935,
            "orticaria": 0.916,
            "pediculosi": 0.851,
            "scabbia": 0.898,
            "varicella": 0.865
        }},

16: {"coverage": 0.899, "avg_size": 0.900,
        "class_cov": {
            "esantema-maculo-papuloso": 0.908,
            "esantema-morbilliforme": 0.926,
            "esantema-polimorfo-like": 0.897,
            "esantema-virale": 0.913,
            "esantema_iatrogeno_farmaco_indotta": 0.954,
            "orticaria": 0.890,
            "pediculosi": 0.740,
            "scabbia": 0.909,
            "varicella": 0.852
        }},

17: {"coverage": 0.899, "avg_size": 0.900,
        "class_cov": {
            "esantema-maculo-papuloso": 0.857,
            "esantema-morbilliforme": 0.916,
            "esantema-polimorfo-like": 0.864,
            "esantema-virale": 0.885,
            "esantema_iatrogeno_farmaco_indotta": 0.948,
            "orticaria": 0.909,
            "pediculosi": 0.909,
            "scabbia": 0.907,
            "varicella": 0.774
        }},

18: {"coverage": 0.897, "avg_size": 0.899,
        "class_cov": {
            "esantema-maculo-papuloso": 0.871,
            "esantema-morbilliforme": 0.950,
            "esantema-polimorfo-like": 0.863,
            "esantema-virale": 0.882,
            "esantema_iatrogeno_farmaco_indotta": 0.923,
            "orticaria": 0.910,
            "pediculosi": 0.845,
            "scabbia": 0.900,
            "varicella": 0.864
        }},
```

```
    19: {"coverage": 0.898, "avg_size": 0.900,
         "class_cov": {
             "esantema-maculo-papuloso": 0.869,
             "esantema-morbilliforme": 0.925,
             "esantema-polimorfo-like": 0.884,
             "esantema-virale": 0.877,
             "esantema_iatrogeno_farmaco_indotta": 0.927,
             "orticaria": 0.927,
             "pediculosi": 0.875,
             "scabbia": 0.843,
             "varicella": 0.839
         }},

    20: {"coverage": 0.898, "avg_size": 0.899,
         "class_cov": {
             "esantema-maculo-papuloso": 0.893,
             "esantema-morbilliforme": 0.934,
             "esantema-polimorfo-like": 0.902,
             "esantema-virale": 0.899,
             "esantema_iatrogeno_farmaco_indotta": 0.930,
             "orticaria": 0.893,
             "pediculosi": 0.913,
             "scabbia": 0.891,
             "varicella": 0.861
         }},
}
```

In [10]:
```python
import numpy as np
import matplotlib.pyplot as plt
```

In [ ]:
```python
# disease_name_map = {
#     "esantema-maculo-papuloso": "Maculopapular exanthema",
#     "esantema-morbilliforme": "Morbilliform exanthema",
#     "esantema-polimorfo-like": "Polymorphous exanthema",
#     "esantema-virale": "Viral exanthema",
#     "esantema_iatrogeno_farmaco_indotta": "Iatrogenic drug-induced exanthema",
#     "orticaria": "Urticaria",
#     "pediculosi": "Pediculosis",
#     "scabbia": "Scabies",
#     "varicella": "Chickenpox",
# }


# def rename_class_names(results_dict, name_map):
#     new_results = {}
#     for k, v in results_dict.items():
#         new_class_cov = {
#             name_map.get(class_name, class_name): value
#             for class_name, value in v["class_cov"].items()
#         }
#         new_results[k] = {
#             "coverage": v["coverage"],
#             "avg_size": v["avg_size"],
#             "class_cov": new_class_cov
#         }
```

```
#     return new_results


# resnet_results_en = rename_class_names(resnet_results, disease_name_map)
# vit_results_en = rename_class_names(vit_results, disease_name_map)
```

In [21]:
```python
disease_name_map = {
    "esantema-maculo-papuloso": "Maculopapular exanthema",
    "esantema-morbilliforme": "Morbilliform exanthema",
    "esantema-polimorfo-like": "Polymorphous exanthema",
    "esantema-virale": "Viral exanthema",
    "esantema_iatrogeno_farmaco_indotta": "Iatrogenic drug-induced exanthema",
    "orticaria": "Urticaria",
    "pediculosi": "Pediculosis",
    "scabbia": "Scabies",
    "varicella": "Chickenpox",
}


def rename_class_names_inplace(results_dict, name_map):
    for _, v in results_dict.items():
        class_cov = v["class_cov"]

        for old_name in list(class_cov.keys()):
            if old_name in name_map:
                class_cov[name_map[old_name]] = class_cov.pop(old_name)


rename_class_names_inplace(resnet_results, disease_name_map)
rename_class_names_inplace(vit_results, disease_name_map)
```

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [22]:
```python
import numpy as np

def avg_metric(results_dict, metric):
    return np.mean([results_dict[r][metric] for r in results_dict])

avg_resnet_coverage = avg_metric(resnet_results, "coverage")
avg_resnet_size     = avg_metric(resnet_results, "avg_size")

avg_vit_coverage = avg_metric(vit_results, "coverage")
```

```
avg_vit_size      = avg_metric(vit_results, "avg_size")

print("ResNet   AVG Coverage:", round(avg_resnet_coverage,3))
print("ResNet   AVG Set Size:", round(avg_resnet_size,3))
print("ViT      AVG Coverage:", round(avg_vit_coverage,3))
print("ViT      AVG Set Size:", round(avg_vit_size,3))
```

```
ResNet   AVG Coverage: 0.9
ResNet   AVG Set Size: 0.905
ViT      AVG Coverage: 0.9
ViT      AVG Set Size: 0.901
```

In [23]:
```python
# All class names
class_names = list(resnet_results[9]["class_cov"].keys())

def avg_class_cov(results_dict):
    class_covs = {cls: [] for cls in class_names}
    for r in results_dict:
        for cls in class_names:
            class_covs[cls].append(results_dict[r]["class_cov"][cls])
    return {cls: np.mean(class_covs[cls]) for cls in class_names}

resnet_class_avg = avg_class_cov(resnet_results)
vit_class_avg    = avg_class_cov(vit_results)

print("\nAvg class-wise coverage (ResNet):")
print(resnet_class_avg)
print("\nAvg class-wise coverage (ViT):")
print(vit_class_avg)
```

```
Avg class-wise coverage (ResNet):
{'Maculopapular exanthema': np.float64(0.8660500000000001), 'Morbilliform exanthem
a': np.float64(0.93635), 'Polymorphous exanthema': np.float64(0.8471), 'Viral exanth
ema': np.float64(0.8854), 'Iatrogenic drug-induced exanthema': np.float64(0.9285),
'Urticaria': np.float64(0.9107500000000002), 'Pediculosis': np.float64(0.91895000000
00003), 'Scabies': np.float64(0.9094000000000001), 'Chickenpox': np.float64(0.8318)}

Avg class-wise coverage (ViT):
{'Maculopapular exanthema': np.float64(0.88375), 'Morbilliform exanthema': np.float6
4(0.9393500000000001), 'Polymorphous exanthema': np.float64(0.8566), 'Viral exanthem
a': np.float64(0.8886499999999999), 'Iatrogenic drug-induced exanthema': np.float64
(0.9378), 'Urticaria': np.float64(0.9063000000000001), 'Pediculosis': np.float64(0.8
9085), 'Scabies': np.float64(0.89865), 'Chickenpox': np.float64(0.8544499999999999)}
```

In [24]:
```python
x = np.arange(len(class_names))
width = 0.38
target = 0.90

resnet_vals = [resnet_class_avg[c] for c in class_names]
vit_vals    = [vit_class_avg.get(c, np.nan) for c in class_names]

plt.figure(figsize=(14,6))

resnet_colors = ["cornflowerblue" if v >= target else "royalblue" for v in resnet_v
vit_colors    = ["lightcoral" if v >= target else "firebrick" for v in vit_vals]

bars_res = plt.bar(x - width/2, resnet_vals, width, label="ResNet", color=resnet_co
```

```python
bars_vit = plt.bar(x + width/2, vit_vals,    width, label="ViT",    color=vit_color

plt.axhline(target, linestyle="--", color="gray", label=f"Target {target:.2f}")


for bar, val in zip(bars_res, resnet_vals):
    height = bar.get_height()
    plt.annotate(f"{val:.3f}",
                 xy=(bar.get_x() + bar.get_width()/2, height),
                 xytext=(0, 3),
                 textcoords="offset points",
                 ha="center", va="bottom", fontsize=8)


for bar, val in zip(bars_vit, vit_vals):
    height = bar.get_height()
    plt.annotate(f"{val:.3f}",
                 xy=(bar.get_x() + bar.get_width()/2, height),
                 xytext=(0, 3),
                 textcoords="offset points",
                 ha="center", va="bottom", fontsize=8)

plt.xticks(x, class_names, rotation=45, ha="right")
plt.ylabel("Coverage")
plt.title("Class-wise Coverage: ResNet vs ViT")
plt.ylim(0.80, 1.02)
plt.legend()
plt.tight_layout()
plt.show()
```
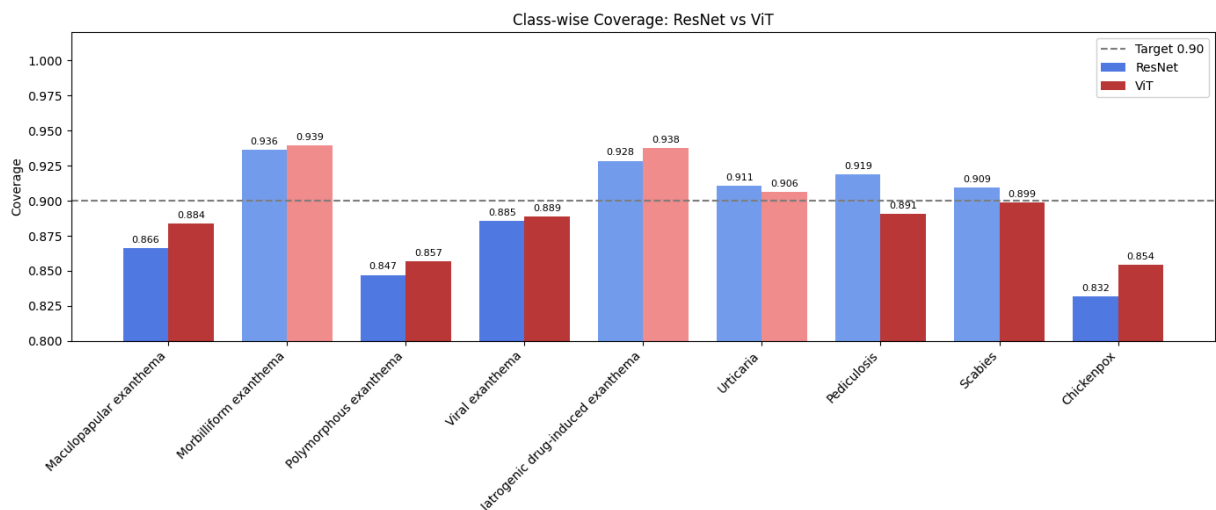


Class-wise Coverage: ResNet vs ViT

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from typing import Optional, Tuple


def plot_avg_coverage_at_nominal(
    df: pd.DataFrame,
    nominal: float = 0.90,
    model_order: Tuple[str, str] = ("ResNet50", "ViT"),
```

```python
    model_labels: Tuple[str, str] = ("ResNet-50", "Vision Transformer (ViT)"),
    dpi: int = 300,
    out_path: Optional[str] = None,
):
    required = {"model", "run", "target_coverage", "coverage"}
    if not required.issubset(df.columns):
        raise ValueError(f"df must contain columns: {required}")

    t = round(float(nominal), 2)

    d = df.copy()
    d["target_coverage"] = d["target_coverage"].astype(float).round(2)
    d = d[d["target_coverage"] == t].copy()

    if d.empty:
        raise ValueError(
            "No rows found for target_coverage={}. Available targets: {}".format(
                t, sorted(df["target_coverage"].astype(float).round(2).unique())
            )
        )

    agg = (
        d.groupby("model")["coverage"]
         .agg(["mean", "std", "count"])
         .reindex(list(model_order))
    )
    agg["sem"] = agg["std"] / np.sqrt(agg["count"])

    means = agg["mean"].values


    plt.figure(figsize=(6.2, 4.6), dpi=dpi)

    bars = plt.bar(
        list(model_labels),
        means,
        color=["#4C72B0", "#DD8452"],
        alpha=0.85
    )


    for x in range(len(means)):
        plt.axvline(
            x=x,
            color="gray",
            linewidth=2.0,
            alpha=0.35,
            zorder=0
        )


    plt.axhline(
        y=t,
        linestyle="--",
        linewidth=1.8,
        color="black",
```

```
        alpha=0.7,
        zorder=5
    )


    for bar in bars:
        h = bar.get_height()
        plt.annotate(
            "{:.4f}".format(h),
            xy=(bar.get_x() + bar.get_width() / 2, h),
            xytext=(0, 6),
            textcoords="offset points",
            ha="center",
            va="bottom",
            fontsize=9
        )

    plt.ylabel("Empirical coverage")
    plt.title("Average Empirical Coverage at Nominal = {:.2f} (α = {:.2f})"
              .format(t, 1.0 - t),
              fontweight="normal")


    ymin = float(np.min(means)) - 0.002
    ymax = max(float(np.max(means)) + 0.002, t + 0.002)
    plt.ylim(ymin, ymax)

    plt.grid(True, axis="y", linewidth=0.6, alpha=0.25)
    plt.tight_layout()

    if out_path is not None:
        plt.savefig(out_path, dpi=dpi, bbox_inches="tight")

    plt.show()
    return agg
```

In [26]:
```
import pandas as pd

rows = []

for run, v in resnet_results.items():
    rows.append({
        "model": "ResNet50",
        "run": run,
        "target_coverage": 0.90,
        "coverage": v["coverage"]
    })

for run, v in vit_results.items():
    rows.append({
        "model": "ViT",
        "run": run,
        "target_coverage": 0.90,
        "coverage": v["coverage"]
    })
```
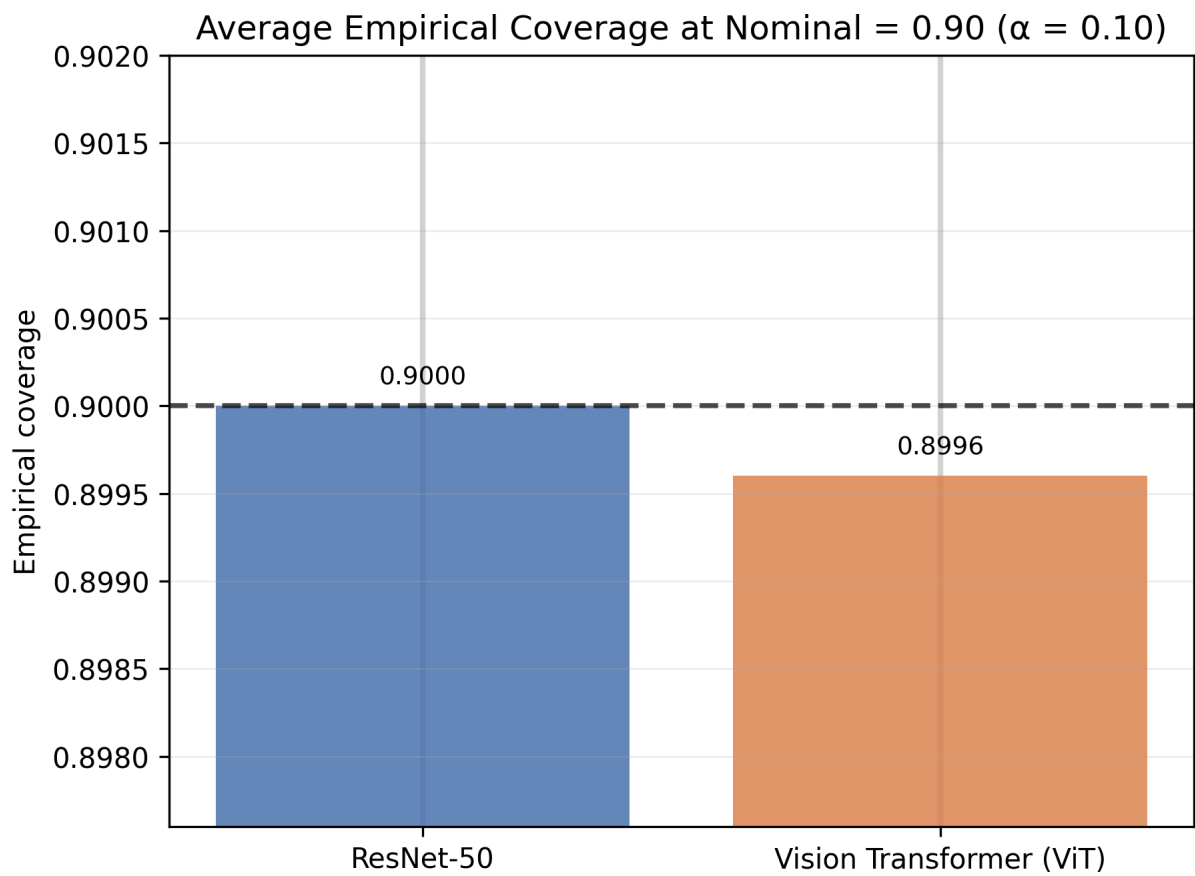
```python
df_coverage = pd.DataFrame(rows)
plot_avg_coverage_at_nominal(
    df_coverage,
    nominal=0.90,
    out_path="avg_coverage_nominal_0.90.png"
)
```

### Average Empirical Coverage at Nominal = 0.90 (α = 0.10)



Out[26]:

| model | mean | std | count | sem |
|---|---|---|---|---|
| ResNet50 | 0.9000 | 0.001026 | 20 | 0.000229 |
| ViT | 0.8996 | 0.001188 | 20 | 0.000266 |

In [ ]:

```python
In [27]: import numpy as np
import matplotlib.pyplot as plt

def plot_classwise_coverage_comparison(
    class_names,
    resnet_class_avg,
    vit_class_avg,
    target: float = 0.90,


    figsize=(14, 6),
    dpi=300,
```

```python
    class_fontsize: int = 10,        # x-tick labels
    y_label_fontsize: int = 12,
    title_fontsize: int = 14,
    legend_fontsize: int = 10,
    annotate_fontsize: int = 9,


    bar_width: float = 0.38,
    resnet_color_pass: str = "cornflowerblue",
    resnet_color_fail: str = "royalblue",
    vit_color_pass: str = "lightcoral",
    vit_color_fail: str = "firebrick",
    bar_alpha: float = 0.9,


    target_line_style: str = "--",
    target_line_color: str = "gray",
    target_line_width: float = 1.2,


    grid: bool = True,
    grid_axis: str = "y",
    grid_linewidth: float = 0.6,
    grid_alpha: float = 0.35,


    ylim: tuple = (0.80, None),
    headroom_frac: float = 0.06,

):
    x = np.arange(len(class_names))

    resnet_vals = [resnet_class_avg[c] for c in class_names]
    vit_vals    = [vit_class_avg.get(c, np.nan) for c in class_names]

    plt.figure(figsize=figsize, dpi=dpi)


    resnet_colors = [
        resnet_color_pass if v >= target else resnet_color_fail
        for v in resnet_vals
    ]
    vit_colors = [
        vit_color_pass if v >= target else vit_color_fail
        for v in vit_vals
    ]

    bars_res = plt.bar(
        x - bar_width / 2,
        resnet_vals,
        bar_width,
        label="ResNet",
        color=resnet_colors,
        alpha=bar_alpha,
```

```python
    )

    bars_vit = plt.bar(
        x + bar_width / 2,
        vit_vals,
        bar_width,
        label="ViT",
        color=vit_colors,
        alpha=bar_alpha,
    )


    y_max = np.nanmax(resnet_vals + vit_vals)
    plt.ylim(
        bottom=ylim[0],
        top=y_max * (1.0 + headroom_frac) if ylim[1] is None else ylim[1],
    )


    plt.axhline(
        target,
        linestyle=target_line_style,
        color=target_line_color,
        linewidth=target_line_width,
        label=f"Target {target:.2f}",
    )


    def _annotate(bars, values):
        for bar, val in zip(bars, values):
            if np.isnan(val):
                continue
            h = bar.get_height()
            plt.annotate(
                f"{val:.3f}",
                xy=(bar.get_x() + bar.get_width() / 2, h),
                xytext=(0, 3),
                textcoords="offset points",
                ha="center",
                va="bottom",
                fontsize=annotate_fontsize,
            )

    _annotate(bars_res, resnet_vals)
    _annotate(bars_vit, vit_vals)


    plt.xticks(x, class_names, rotation=45, ha="right", fontsize=class_fontsize)
    plt.ylabel("Coverage", fontsize=y_label_fontsize)
    plt.title("Class-wise Coverage: ResNet vs ViT", fontsize=title_fontsize)


    if grid:
        plt.grid(True, axis=grid_axis, linewidth=grid_linewidth, alpha=grid_alpha)

    plt.legend(fontsize=legend_fontsize)
```
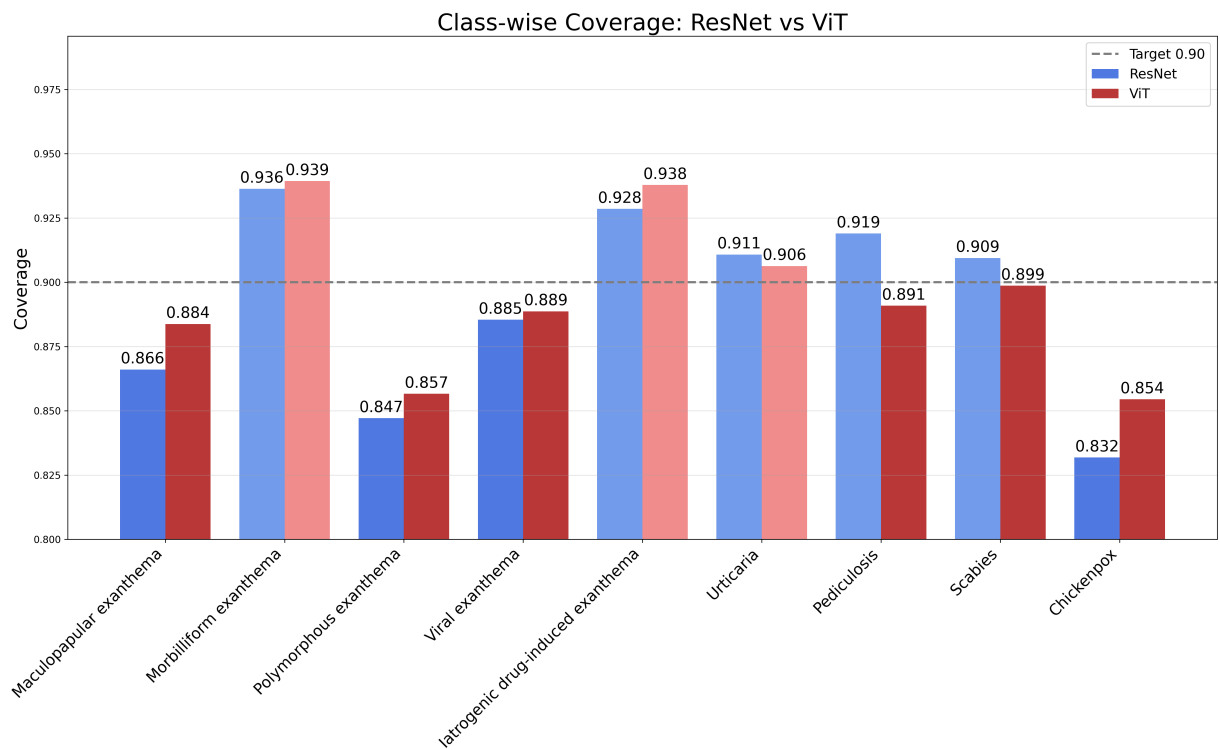
```
        plt.tight_layout()
        plt.show()
```

In [30]:
```
plot_classwise_coverage_comparison(
    class_names,
    resnet_class_avg,
    vit_class_avg,
    target=0.90,
    figsize=(18, 11),
    class_fontsize=16,
    annotate_fontsize=16,
    title_fontsize=24,
    legend_fontsize=14,
    y_label_fontsize=18,
    grid=True,
    grid_linewidth=0.8,
    grid_alpha=0.35,
    target_line_width=2.3,
)
```

### Class-wise Coverage: ResNet vs ViT